S. Hrg. 98-391

U.S. WEATHER SATELLITES AND SERVICES

HEARING

BEFORE THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

NINETY-EIGHTH CONGRESS

FIRST SESSION

ON

U.S. WEATHER SATELLITES AND SERVICES

AUGUST 22, 1983

Serial No. 98-39

Printed for the use of the Committee on Commerce, Science, and Transportation

U.S. GOVERNMENT PRINTING OFFICE
25-753 O WASHINGTON : 1983

S261-55

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CONTENTS

Page

Opening statement by Senator Gorton 1

LIST OF WITNESSES

Graves, Bud, meteorologist in charge, NWS, Yakima, Wash.; Gaylord Enbom, orchardist; Barry Aronovitch, meteorologist in charge, NWS, Olympia, Wash.; and Stewart Bledsoe, executive director, Washington Forest Protection Association 40
  Prepared statement of Mr. Enbom 44
  Prepared statement of Mr. Bledsoe 51
Hassel, Harry, Deputy Director, Western Region, National Weather Service 3
Hutcheon, Dick, area manager, NWS, Seattle; Dennis Petersen, North Pacific Fishing Vessel Owners Association; Bob Jackson, forecaster, NWS, Seattle; and Robert Jorgensen, president, Horizon Airlines 31
Reed, Dr. Richard, professor of atmospheric sciences, University of Washington; Stanley Marczewski, vice president, NWS Employees Union; and Ray Ramsey, KOMO-TV, Seattle 11
  Prepared statement of Dr. Reed 12
  Prepared statement of Mr. Marczewski 15
Stearns, Art, supervisor, Washington Department of Natural Resources and State forester; and Hugh Fowler, director, Washington Department of Emergency Services 7
Trudell, Bernard, Sarsat, Mission Manager, NASA; and Dick Hutcheon, area manager, NWS, Seattle 55
  Prepared statement of Mr. Trudell 60

ADDITIONAL ARTICLES, LETTERS, AND STATEMENTS

Alverson, Robert D., manager, Alaska Marketing Association, statement 34
Boyle, Brian, commissioner of public lands, State of Washington, statement 71
East Wenatchee Grange No. 1012, resolution 75
Gillett, Stephen L., statement 72
Hill, Ray, master, Washington State Grange, letter of August 16, 1983 75
Hopkins, Joe, president, Seattle L-5 Society Chapter one, statement 75
Larson, William H., director, Keep Washington Green Association, Inc., statement 73
Nowcasting, Inc., statement 74

U.S. WEATHER SATELLITES AND SERVICES

MONDAY, AUGUST 22, 1983

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Seattle, Wash.

The committee met, pursuant to notice, at 9 a.m., in the South Auditorium, New Federal Building, Hon. Slade Gorton presiding.

Staff members assigned to this hearing: Dennis Barnes, professional staff member; and Steven Flajser, minority professional staff member.

OPENING STATEMENT BY SENATOR GORTON

Senator GORTON. Welcome to this hearing before the U.S. Senate Committee on Commerce, Science, and Transportation.

Our subjects for the hearing today are the weather satellites and services of the National Weather Service of the National Oceanic and Atmospheric Administration [NOAA].

Weather information is among the oldest of the services provided by the Federal Government; the U.S. Weather Bureau, now the National Weather Service, was founded more than 110 years ago. Over the years our understanding of weather phenomena has steadily improved and, accordingly, so have the specialized services which are available. Satellite pictures are now common fare on television weather reports, along with increasingly accurate forecasts of extreme as well as common weather events. The agriculture, aviation, and fishing industries all depend on readily available, accurate weather information, without which lives and the economy of our State would be in jeopardy.

In no State is weather information more important than here in Washington. We have the Nation's highest per capita boat ownership and major marine and fishing industries which are critically dependent on accurate weather data. Inland, our farmers need timely knowledge of weather conditions for planting, spraying, harvesting and avoidance of damage from extreme weather events, like sudden frost. Billions of dollars in timber in Washington's forests are continuously monitored by the fire warning services of the Federal and State governments.

Ours is a large State, which has an extensive population of private aircraft operators. These operators are very dependent on reliable information about weather conditions, which vary considerably along the coasts, in the mountains and across the eastern plains.

Mount St. Helens has created its own requirements for monitoring of weather-related hazards.

Proposals have been made in recent years which would alter the provision of weather services to the general public and specialized users. The laudable goal of most of the proposals has been more efficient use of public resources. That this goal would be achieved is less certain.

As an example, this and previous administrations have proposed the closing of a number of smaller Weather Service offices, including that in Walla Walla. In response, the Commerce Committee included specific language in its NOAA authorization legislation prohibiting such closings without detailed prior study and justification. As a result most of the closings have not occurred.

Proposals to charge users of aviation weather forecasts have also been rejected by the committee, but the idea of directly charging those who use services is still an announced intention of the administration. In principle, it is a reasonable goal, but relatively little is known about the efficiency of such reforms or their effect on public safety and fair access to services.

There is in effect a regulation (A-76) of the Office of Management and Budget which requires that services be provided by private contractors rather than the Federal agencies where cost savings can be shown. Again, the intention of the regulation is hard to fault, but determining clearly that cost savings will result and assuring that public safety and fair access to services will be maintained is less clear.

Perhaps the greatest controversy has arisen over the President's announcement on March 8 to turn over the Government's weather and land remote sensing satellites to the private sector. This prospect has drawn sharp reactions from the public and Congress alike. In a letter to Commerce Secretary Baldrige, I expressed my own feeling that no compelling case can be made for the transfer of the weather satellites.

It is our intention today to learn more about how weather services affect the economy and public safety of Washington State and the Pacific Northwest, and the probable effects on these services, should changes be made.

In addition, we will hear about two special services, monitoring of the extreme weather conditions around Mount St. Helens and search and rescue satellites, which have extra significance for Washington.

At the conclusion of the hearing there will be a demonstration of search and rescue satellites and tracking systems, which will take place on the roof of the Exchange Building next door.

It is a pleasure to welcome everyone here today and to acknowledge the interest which has been shown in this hearing.

As we have a large number of witnesses, we will inform each of you in advance that your entire written statement will be included in the record as if you had read it, and ask you, to the extent that your statements are longer than a page or two, to summarize the salient points orally.

We will begin with Mr. Harry S. Hassel, the Deputy Director of the Western Region.

Mr. Hassel, welcome.

STATEMENT OF HARRY HASSEL, DEPUTY DIRECTOR, WESTERN REGION, NATIONAL WEATHER SERVICE

Mr. HASSEL. Thank you, and good morning.

Mr. Chairman, my name is Harry Hassel. I am Deputy Director for the National Weather Service [NWS], Western Region. My office is in Salt Lake City, where we have a headquarters with the responsibility for managing weather service programs over eight Western States, including the State of Washington.

I am pleased to have the opportunity to give testimony at this hearing on these services provided to the citizenry of Washington. It is my intent in this testimony to describe the big picture regarding the mechanics of providing a weather service so that later testimony, which will deal with the service specifics, will perhaps be a little clearer.

The science of operational meteorology or weather forecasting is dependent on the application of meteorological theory as well as the capability for real-time, continuous monitoring of the state of the atmosphere. The theory is introduced into our decisionmaking process through the use of numerical weather prediction models, which are a mathematical simulation of the atmosphere in a computer. The model efficiency is greatly dependent on proper initialization, which requires collection of weather reports from around the world—meteorology is truly a global effort.

Since weather observations are not available in sufficient density from all parts of the world, we rely heavily on both geostationary and polar-orbiting satellites to fill the data gaps. The models are run at our National Meteorological Center on the outskirts of Washington, D.C. The models, in essence, mathematically time-step the atmosphere into the future. The output from these models is then distributed as guidance to operational weather forecasters located in National Weather Service offices throughout the United States and is used as a primary tool in preparing forecast products.

The model guidance is not sufficiently accurate or detailed enough to provide all the information a forecaster must have to do a good job. We must also make available to the forecaster the ability to assess and monitor the real-time conditions of the atmosphere. This provides the capability to make determinations on the need for updating forecasts or generating early warnings of developing weather events. This real-time information is obtained through manual surface observations from land and sea locations, weather radar observations, lightning detection observations, cooperating public weather observers, and from our weather satellites. This may sound like an overabundance of data, but it is not. A deterioration in any of these data sources leads to a reduced forecast efficiency. All of these are important data sources. I could not categorically distinguish one as more important than another, but I would like to elaborate on the satellite program for just a moment.

The satellites have become an essential ingredient in weather prediction. They give us the ability to better initialize our numerical models as well as provide a unique spectrum of data which are not obtainable in any other way. From satellite information we can assess such things as sea-surface temperature and boundary of polar ice packs, as well as monitor storm development and intensity, and collect important hydrological information. Weather data from satellites are the prime source of information over the data-sparse Pacific Ocean. Satellite information is used in all of the programs which will be described in later testimony. Satellite information was paramount to the ability of Pacific Northwest forecasters to issue early warnings of rapidly intensifying coastal storms which affected western Washington and Oregon on several occasions in the recent past.

Getting to our facility configuration in the State of Washington, the primary forecast facility to receive this large variety of weather information is located here in Seattle. Meteorologists at this office interpret all of these data and produce the public zone forecasts for the entire State. The office is staffed to provide forecast and warning services to Washington 24 hours per day and 7 days per week. You will be hearing more about these operations in later testimony. In addition to our Seattle office, we also have facilities at six other locations in the State. These are Olympia, Yakima, Wenatchee, Walla Walla, Spokane, and at the FAA's Air Route Traffic Control Center in Auburn. These offices have smaller staffs and are tasked with responsibilities dependent on their location and the particular service needs within their areas of responsibility. They are our prime source of surface weather observations to obtain ground truth of the atmosphere. Not all are 24-hour facilities.

The key to our operations anywhere in the United States is the word service. We play an integral role in the State and local economies which you will hear more about in later testimony. We work closely with State and local officials on weather problems and advise on disaster preparedness planning. We also advise on river and flash-flood potential within the State and during actual events work directly with emergency response groups. We work closely with local radio, TV, and newspapers in providing weather information for dissemination to the public. We operate our own NOAA weather radios continuously to provide weather information directly to the public and emergency officials. Our services touch and affect every citizen.

These services can be categorized primarily into watches and warnings of severe weather to the public, support for aviation, agriculture, forestry, and marine interests.

We are very proud of our service and appreciate the opportunity to give you a capsule summary at this hearing.

I would be happy to answer any questions.

Senator GORTON. Mr. Hassel, is it possible, in your view—and, if it is, would you give an example—of the way in which private sector commercialization of weather services might open up new markets and/or lower prices?

Mr. HASSEL. The National Weather Service is an organization which requires a core configuration in order to provide good public forecast and warning services to the American public.

There is not a great deal of resource addition which is required to our core programing to provide services such as fire, weather, marine, agriculture, and things of this type. It does not cost the Government a great deal of money to provide these services.

I am sure that there are opportunities for private interests within these areas, but it is my personal consideration that these particular core services that we are providing are probably the best way to get the job done.

Senator **Gorton**. Is there any possibility that the private sector might be more likely than the Government to take advantage of cost-saving new technologies?

Mr. **Hassel**. We try to keep very openminded in the weather services to technological opportunities. For instance, right now we are looking into the remainder of the decade in trying to take advantage of what might come up as new technology, to provide for our forecasters, to enable them to do a better job.

I think that we are on the leading edge of technological improvement and utilization of the state of technology. I would not anticipate that there would be a great deal of new horizon to be found if private industry were to be incorporated more into the weather services.

Senator **Gorton**. As you know, at this stage it seems unlikely that the proposal to transfer the weather satellites to the private sector will actually take place. But, if it were to be considered seriously, what conditions do you believe should be attached to such a change?

Mr. **Hassel**. Senator, I don't know a great deal about the specifics of the commercialization issue, but it is imperative, as I stated in my testimony, that the National Weather Service forecasters, who are very deeply involved in providing services that protect public property and reduce loss of life among the citizenry of the country, continue to have available a high-yield and very effective satellite program for our diagnostic purposes.

I would assume that, under a commercialization project, the National Weather Service requirements would be folded in and that we would continue to receive the same fine service that we are receiving now. It would be my hope that that would certainly be the case.

Senator **Gorton**. That's a primary condition?

Mr. **Hassel**. Yes. That's the primary condition from the view of the National Weather Service. Absolutely.

Senator **Gorton**. Now, what was not being provided to the public by the existing television and radio media, which prompted the formation of NOAA's radio weather service?

Mr. **Hassel**. Actually, the origin of the NOAA weather radio service began along the coastal areas of the United States, where it was difficult for us to transmit effective warning services out to people in the marine environment. Improved communications with mariners was the impetus behind the program.

As the program gathered momentum it became apparent to many people that this was a very good technique for distribution of all weather warnings immediately to the public, upon knowledge that these warnings were necessary to protect life or property.

In certain parts of the country it becomes very, very important to get warning information to the public quickly—in particular in response to tornadoes and violent storms of this type—time is precious.

NOAA weather radio gives us a direct access to the public. It gives us a positive access with the warning alarm feature which is incorporated in the NOAA weather radio and draws listeners attention to important information.

Also, we have prided ourselves in the NOAA weather radio program being able to reach most of the public with general weather forecast services, as well. It is not dependent upon a concentration of population in the areas that are covered; it is available to most people. So, at times when commercial radio stations go off the air in the evening in rural areas, the NOAA weather radio continues to operate and we continue to have access to those people day and night.

Senator GORTON. Finally, in your written statement, you spoke of real-time conditions, which must be known and observed at ground level to make reliable weather forecasts.

Isn't that necessity inconsistent with the proposal to close a number of smaller Weather Service offices, such as that at Walla Walla?

Mr. HASSEL. Yes; it's very inconsistent with those proposals. The National Weather Service is very, very concerned about the data network that we have available to work with right now. It is a very sparse and minimum network.

Senator GORTON. You have stations set up at the present at such a distance from one another, for weather conditions, so that you are not getting, let's say, essentially exactly the same information from Walla Walla as Spokane?

Mr. HASSEL. Weather is the type of business that in a matter of miles you can have major differences in conditions and major differences in requirements for service to the public on a given weather event. So the distance between stations is a very important factor. We need to have a sufficient density to be able to properly analyze the weather event as it's taking place.

Senator GORTON. What kind of services do you get from smaller stations, from those which don't operate 24 hours a day?

Mr. HASSEL. Well, many of the smaller stations do take weather observations for the time period that they are open. And at certain locations we have cooperation from other Federal agencies for taking observations during the part of the day that we are not able to.

Some of the smaller stations main contribution to the area is concentrated in weather forecasts and warnings and in areas of special services that are of most importance to those areas.

Senator GORTON. You mean like marine services, forest services?

Mr. HASSEL. Yes. Well, like in Walla Walla, the farmers and growers in that area have direct access to our weather office and can incorporate into their decisionmaking the weather situation or the weather forecasts. So we tend, at some of the smaller offices, to concentrate on the local community's needs, and also provide data assistance to the forecast system when they're open.

Senator GORTON. Thank you very much for your formal testimony and for the answers to the questions. We appreciate that. Thank you.

Now we move to our first panel, which is to represent the State of Washington: Mr. Stearns and Mr. Fowler.

With this panel and with succeeding panels we will hear from all the panelists and then ask questions.

STATEMENTS OF ART STEARNS, SUPERVISOR, WASHINGTON DEPARTMENT OF NATURAL RESOURCES AND STATE FORESTER; AND HUGH FOWLER, DIRECTOR, WASHINGTON DEPARTMENT OF EMERGENCY SERVICES

Mr. **Stearns**. Good morning, Mr. Chairman.

I am Art Stearns, supervisor of the State of Washington department of natural resources and also the State forester for Washington.

The DNR protects 12.5 million acres of private and public lands from wildfire The remaining 14 million acres of Federal lands in Washington State are protected by various Federal agencies. Each of these protection agencies relies on the services of the National Weather Service fire weather program. Without adequate fire weather services, it would be impossible for these agencies to fulfill their protection responsibilities.

In addition to forest fire protection, the legislature has directed DNR to administer the State smoke management program. This program provides for air quality regulation for silviculture activities throughout the entire State. It is a cooperative effort of the DNR, Washington Forest Protection Association, the U.S. Forest Service, the Bureau of Indian Affairs, and the Washington State Department of Ecology. The smoke management program addresses the preservation of air quality in populated areas as well as federally mandated class I and wilderness areas. The 1977 amended Federal Clean Air Act requires the protection of class I areas from human-caused air pollution. Eight class I areas in Washington covering nearly 4 million Federal acres are to receive this protection. Implementation of additional visibility protection for these areas makes the forecasting services of the National Weather Service increasingly more important to my agency. DNR currently operates six remote automated weather stations and has plans to purchase additional weather equipment to enhance the program to meet the requirements of class I area protection.

The protection of forest lands and the maintenance of air quality are both of major concern to the citizens of our State. Washington and the adjacent States of Idaho and Oregon produced 25 percent of the timber harvested in the United States in 1981. In addition to direct employment in the forest industry, one in five manufacturing jobs in Washington is directly related to the forest products industry. Many additional jobs are dependent upon recreational activities that take place on Washington's forest lands. And all Washington citizens enjoy the Evergreen State's well-known clean air.

Forests are one of the Evergreen State's greatest assets. Adequate protection of this resource depends upon accurate and timely weather observations and forecasts.

Providing such services is in the Nation's as well as the State's interest. Recognizing this, we have entered into a cooperative agreement with the National Weather Service. The department of natural resources provides office space and services for two National Weather Service meteorologists and also employs one agency meteorologist. Through this agreement, we receive professional assistance, weather data, and mobile forecasting units. The department also utilizes the NOAA satellite service for the collection and transmission of data from remote field weather stations.

The Olympia Weather Office is located at the center of the department's statewide communications and data collection center. This office provides overall State coordination and forecasting for the majority of western Washington. Additional fire weather offices in Portland and Wenatchee provide forecasting services for the southern and eastern portions of our State.

The June 1983 Booz-Allen & Hamilton consultant study proposes some sweeping changes to the organizational structure and services currently being provided by the National Weather Service. DNR considers the current weather program to be a Federal-State partnership. The Booz-Allen recommendations violate this partnership and we therefore do not endorse the study. Should these proposals be implemented, I fear that our citizens will suffer increased loss of resources, and perhaps human life, from fire. They would also be subject to more frequent episodes of air quality degradation. Therefore, we feel that, one, the fire weather program is of such importance to the public that it should be included in the core mission of the National Weather Service; two, weather conditions are so diverse in this State that a reduction in the level of fire weather service offices would be unacceptable; and, three, it is in the national interest for the Federal Government to continue to operate the satellite service.

In summary, the services currently being provided by the National Weather Service fire weather offices are essential to the adequate protection of Washington's forests and air quality. All citizens are dependent upon the continued availability of these services. We believe the most efficient level of service can best be provided by one agency, and that is the National Weather Service.

Thank you.

Senator GORTON. Thank you.

Mr. Fowler.

Mr. FOWLER. Mr. Chairman, I am Hugh Fowler, director of the Washington State Department of Emergency Services. Under State law and our disaster preparedness plan, my department is mandated to issue unusual weather advisories and warning information to local government emergency services and law enforcement organizations throughout the State. The State emergency broadcast system is also used to inform the general public. Timely and accurate distribution of such information is vital in meeting government's foremost responsibility—to protect life and property.

We receive a wide range of weather information from the National Weather Service in the form of advisories, watches, and warnings. Included is information relating to flooding, severe weather advisories, and warnings, and tsunami information. In addition, we depend upon the National Weather Service for information on wind plume trajectories for volcanic ash and toxic or radioactive substances. The information is received from the National Weather Service via the national warning system [Nawas], NOAA weather teletype, and NOAA weather radio.

These systems have proven to be reliable for many years. The National Weather Service is our only official source for receiving weather information.

We would view with great concern any change or reduction in services presently provided by the National Weather Service. Although private weather forecasting businesses have appeared in recent years, we strongly doubt their long-term credibility and reliability. Is it possible to buy or contract for accurate, timely and dependable weather forecast information? Who suffers or loses when the weather advisory or warning information system breaks down or functions inadequately? These questions need to be addressed before changing or eliminating a credible, trustworthy system that has functioned well for many years and continues to serve the States, local governments and citizens of this country efficiently.

Thank you, Mr. Chairman, for the opportunity to testify on this important matter.

Senator GORTON. Thank you, Mr. Fowler.

My first question is primarily to Mr. Stearns: Now, is the ability of the polar orbiting satellites to detect temperature variations utilized at all in forest fire detection?

Mr. STEARNS. I think, right off the bat, Mr. Chairman, you've gotten too technical for me. Mr. Barry Aronovitch, who is on a later panel, might be better able to answer that than I can, at that technical level.

Senator GORTON. And for Mr. Fowler, you commented on this subject in the course of your written statement. I would like to ask you two related questions about privatization.

First, whether or not you or Mr. Stearns know of any proposals by the private sector to offer competitive or superior weather services to those now provided by NOAA; and, second, what the present limitations are which you see in the services provided by NOAA, and whether they could be supplemented, at least, by private organizations offering contract services.

Mr. FOWLER. During the past 2 years, at least two of the counties within the State of Washington have contracted with private concerns, one out of Portland, and one in northwest Washington.

I think my question is: With the National Weather Service's 24 hours a day, 7 days a week, we know that it's there. We know that they are manned. We know that they know what to do. And we don't know that about the private concerns. I think that the National Weather Service is mandated to do the same thing at the Federal level, by law, that we're required to do at the State level. And there's no question that it's going to be done and done right and in a timely fashion.

If you contract to the private concern and they don't do it and the system breaks down, where do you stand? The government is left in limbo.

Senator GORTON. So, at best, you see private services as minor supplements to the National Weather Service's services?

Mr. FOWLER. That's correct.

Senator GORTON. Could either of you comment on the relationship between NOAA's weather radio service and the State emergency broadcast system?

Mr. **Fowler**. They are two different systems. The State emergency broadcast system would be used to disseminate information received from the National Weather Service to either the entire State or segments of the State that may be affected by any type of an unusual weather event or threat.

My understanding, from Mr. Hassel's testimony, is that the weather radio is intended for individuals who might be out on the water, might be out in some remote area, and they can carry this little radio with them to monitor that. So they're two separate systems.

Mr. **Stearns**. I have no comment on that.

Senator **Gorton**. For you, Mr. Stearns: you referred to the June Booz-Allen & Hamilton study proposing sweeping changes in the National Weather Service and stated that your department does not endorse that.

What do you understand the Booz-Allen & Hamilton study to propose, in the way of transfers of public to private responsibility?

Mr. **Stearns**. My understanding is that what is referred to as "specialized weather services," which would include fire weather services, would be proposed to be contracted out of, if they're done by the National Weather Service, the other agencies receiving those services would pay for that as a service, directly.

And as I said in my testimony, I believe in the case of fire weather services particularly, that is a key role of government, we believe, a State-Federal partnership to do that. And it is unlikely, given that partnership, that that could be as effectively contracted to the private sector. And, in fact, it should be a part of the core mission of the National Weather Service.

Senator **Gorton**. There is a follow-up on that: If the same services continue to be provided by NWS but the major commercial beneficiaries of those services were charged a user fee, assuming that that wasn't simply substituted for tax funds, might you not be able to get even better specialized services?

Mr. **Stearns**. That would seem likely; yes—if that could be done.

Senator **Gorton**. So at least that alternative is worth considering?

Mr. **Stearns**. Assuming you mean by "commercial users" the private sector; yes.

Senator **Gorton**. Mr. Fowler, do you have a comment on that?

Mr. **Fowler**. No.

Senator **Gorton**. I'd like to thank both the members of this panel for their help.

Mr. **Stearns**. Thank you, Mr. Chairman.

Senator **Gorton**. Now panel No. 2: Dr. Reed, Mr. Marczewski, and Mr. Ramsey.

Dr. Reed.

STATEMENTS OF DR. RICHARD REED, PROFESSOR OF ATMOSPHERIC SCIENCES, UNIVERSITY OF WASHINGTON; STANLEY MARCZEWSKI, VICE PRESIDENT, NWS EMPLOYEES UNION; AND RAY RAMSEY, KOMO-TV, SEATTLE

Dr. REED. Thank you, Mr. Chairman, for the opportunity to comment on the role of satellites in weather prediction and the potential effects of commercialization on the quality of weather services.

I appear today, in part, as a spokesman for the American Meteorological Society, and in part to present the views of a university instructor who has taught and done research in weather analysis and prediction for more than 30 years.

Meteorological satellites are a relatively new and particularly valuable component of the global observing system that forms the basis for present-day weather forecasting. They possess the unique characteristic of providing day and night coverage of weather conditions for the entire globe.

Satellite observations are particularly valuable in preparing forecasts for inhabited regions that lie downwind of data-sparse ocean areas. The Pacific Northwest is one such region. Satellites also have unique advantages in detecting and tracking small-scale, short-lived storms that produce violent weather in many parts of the United States.

Satellite observations, like other weather observations, are exchanged freely among the nations of the world under arrangements made by the World Meteorological Organization, an international body whose origins go back more than a century. The free exchange of data is essential to the forecast and warning missions of this Nation's civil and military meteorological organizations.

Two types of satellites, polar orbiting and geostationary, are required for optimum surveillance of the atmosphere. Presently, the United States has in operation two polar orbiters, providing 6-hourly observation of essentially the whole globe, and two geostationary satellites, providing half-hourly observation of the United States and adjacent waters. Other nations, notably the U.S.S.R., Japan, India, and a consortium of European nations, also operate satellites. These extend and supplement the observations made by the U.S. satellites.

As a money-saving measure, consideration is being given to cutting back the number of polar orbiters to one. This is regarded as an unwise measure by the meteorological community, if for no other reason than the necessity of having a back-up satellite already in orbit in the event of failure of he primary system.

A recent and deep-felt concern of the meteorological community regarding weather satellites stems from the stated intention of the present administration to turn the ownership and operation of these satellites over to private industry. Reflecting this concern is an appended statement that was drawn up by the American Meteorological Society [AMS]. The AMS is the largest and most broadly based meteorological society in the United States and, indeed, in the world. Its membership includes both practitioners and research workers and represents such diverse interests as Government agencies, the military services, universities, and private industry.

The main concern voiced by the AMS relates to the responsiblity of the Government for maintaining the free exchange of weather information. As previously remarked, free exchange is needed in order for the National Weather Service to perform its basic forecast and warning mission. It is also needed in order for private meteorologists to continue to provide specialized weather services and to maintain their important role in disseminating weather information to the public. It is not clear what the repercussions might be of introducing an element of private control into a system that historically has been the province of governments and surely will remain the province of governments elsewhere in the world. Certainly, stringent regulations would have to be imposed in the event of private intervention.

The appended AMS statement represents an early response to the President's announcement and was drawn up before details of the proposal were known.

A further major concern that has emerged during the intervening period is the possible deleterious effect that commercialization could have on maintaining the present level of services and on improving services through implementation of existing technological opportunities.

Reliable estimates indicate that approximately 95 percent of the revenue for private operation of meteorological satellites will have to be provided by the Federal Government. Thus, commercialization is tantamount to Government subsidy of a private industry and to conferring a monopoly status on that industry. Such a course of action is hardly conducive to economic efficiency. The same services will inevitably cost the taxpayer more or, if more funds are not available, will reduce the level of services. Expanded services that take advantage of new technology will become increasingly difficult to implement.

No one would seriously suggest turning the ownership and operation of a strategic component of the national defense system over to private industry. It is equally misguided to suggest putting a vital component of the meteorological observing system into private hands.

Senator GORTON. Thank you. And, of course, your appended statement will be part of the record.

[The statement follows:]

STATEMENT ON WEATHER SATELLITE OPERATION BY PRIVATE INDUSTRY [1]

The AMS Executive Committee has considered the President's proposal to turn over operation of the nation's weather satellites to private industry. Recognizing that the full proposal is not yet available to us, but recognizing also the seriousness of the issues which have been raised and the interest of the public in understanding these issues, the Executive Committee has made the following statement regarding the announced proposal.

Satellite data and many forms of data from land stations, ships, buoys, and aircraft are provided by the U.S. and many other nations. These data are essential for a variety of public purposes including reducing deaths from severe storms, aiding agriculture and transportation, supporting defense needs, anticipating effects of man-made products on the earth's protective ozone shield, learning whether it may be possible to predict climate, and a host of other purposes. To serve all these functions, these data must be complete and of high quality. They must be integrated through a reliable system which incorporates planning, operations, data collection and processing, research, forecasting, archiving, and dissemination to government agencies, to the general public, to television and radio stations, and to many specialized users in business and industry.

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[1] Approved by the Council of the American Meteorological Society.

Satellite and other data from the U.S. are now exchanged freely with all nations through the Global Telecommunications System, which is operated through the World Meteorological Organization, the oldest and one of the most respected international organizations. The U.S. receives as part of this exchange data from the European, Japanese, and Soviet satellites, as well as other forms of data from virtually every country. Only in this way can the U.S. maintain the surveillance of global weather on which understanding of large scale atmospheric processes and the forecasting of weather beyond a few days depends. This international system has been developed through international negotiations and agreements and is maintained through constant international liasion. We regard as absolutely vital to the national interest the preservation of the free exchange of data, the maintenance of procedures for insuring data quality, and the assurance of continued access to global data.

Satellite and other data are provided to many private meteorological companies who perform a variety of vital services. Professional meteorologists disseminate weather information to the public through television, radio and telephone; and they provide specialized interpretations of weather service products to many businesses and industries, as well as to governmental bodies. The private meteorology sector must have continued and reliable access to high quality data.

Our concern regarding the President's proposal stems directly from the considerations described above. Without knowing the President's proposal in more detail it is not appropriate to evaluate it in more detail. However, to summarize, we believe it to be essential that the proposal provide for the following aspects:

(1) an integrated system of observation, data collection and processing forecasting and dissemination, archiving and supporting research;

(2) support of U.S. governmental needs, both civil and military;

(3) maintaining the international cooperative system with its free exchange of data;

(4) the rapid and effective dissemination of forecasts and warning to the public, now largely dependent on television and radio stations;

(5) incorporation of new technology to increase the effectiveness of forecast and warning services; and

(6) maintaining the viability of the private meteorology sector in rendering specialized services.

These attributes may be difficult to provide in a cost-effective manner under a system in which U.S. weather satellites are owned by industry.

Senator **Gorton**. Now, Mr. Marczewski, you have a statement you wish to make?

Mr. **Marczewski**. Mr. Chairman, there are three National Weather Service facilities in Washington State that have been contracted out in 1981. The Weather Service Meteorological Observatories [WSMO] at Stampede Pass in the Cascades, at Quillayute Airport on the northwest tip of Washington, and the Weather Service Office [WSO] at the Seattle-Tacoma International Airport. These facilities were contracted out under the guise of economy when, in reality, it has cost the public more in lost services. The contractor staff does not provide the same services as the Federal employees they replaced.

Prior to the contracting out of the WSO at the Seattle-Tacoma International Airport, there was a pilot briefing program and a public service program. In addition, the NWS employees were able to respond in rapidly changing weather by issuing limited amended terminal forecasts for the airport. The NWS employees also had the responsibility under the provisions of the National Weather Service operations manual, chapter D-36, to provide under international agreement certain weather information to pilots operating aircraft to overseas destinations.

The surface weather observations from these contracted out facilities are checked monthly at the National Climatic Center for any errors. There is no program to check current weather observations. If any errors are detected on the transmitted weather observations, a telephone call must be made to the lead forecaster at the Seattle Weather Service Forecast Office, who will try to have the report corrected.

The agency did not follow the provisions of the Office of Management and Budget [OMB] Circular A-76 when contracting out these NWS facilities in Washington State. And the agency's review of the National Weather Service Employees Organization's [NWSEO] appeals contained many irregularities. Since the agency is both the judge and jury in the appeals procedure, it is difficult to obtain an objective review of the appeal.

NWSEO is against the contracting out of any National Weather Service facility and especially the contracting out of the National Weather Service facility at major terminals.

Two major weather-related aircraft accidents occurred last year at terminals where the weather observations were contracted out; Air Florida at Washington National Airport and Pan American at New Orleans International Airport.

All National Weather Service facilities are links in the meteorological chain. This chain has already been weakened by the contracting out of a number of National Weather Service facilities. The agency now proposes that this chain be further fragmented with further contracting out.

This fact was widely publicized by the media during the early part of March 1983. The agency downplayed these stories, even though a letter from Mr. James Winchester, NOAA's Associate Administrator, confirmed that NOAA was planning to contract out the major portion of the National Weather Service.

A KOMO television and radio editorial presented by Mr. Ken Schram on March 8 and 9 summarized the consequences on the Reagan administration's proposal to sell the weather services and satellites.

Each year there is a new threat to close a number of National Weather Service facilities across the country. In Washington State, the Olympia Fire Weather Office, the weather service offices at Olympia Airport, Wenatchee and Walla Walla have been threatened with closure.

The new revision to OMB Circular A-76, to become effective October 1, 1982 states,

> Commercial activities involving 10 or fewer full-time employees should be converted to contract without conducting cost comparisons unless reasonable prices cannot be obtained from commercial sources. In those cases, a cost comparison should be conducted.

If this threshold of value is used, then all the National Weather Service facilities in the State, except for the Seattle Weather Service Forecast Office, could possibly be contracted out.

This would leave the public without any direct way to weather information unless the Booz-Allen & Hamilton study recommendations are adopted by the agency. One of the recommendations of the study is to have private meteorological companies charge the public for what is now free weather information.

In addition, the study recommends the elimination of the NOAA weather radio since only 2 percent of the population listen to the weather broadcasts.

I believe that there are many constituents in the State who use the NOAA weather radio and would refute the recommendation to eliminate this service.

The study also recommends the automation of surface weather observations. There are some automated stations now, but critical elements such as amount of clouds, ceilings, prevailing visibility and the important remarks have yet to be perfected.

KOMO television and radio, in the editorial presented by Mr. Ken Schram on July 7 and 8, 1983, alerted the public to the consequences of the Booz-Allen & Hamilton study. The bottom line of the editorial was,

> We think, at the end of 12 months, NOAA should reach the same conclusion we already have reached: Hacking away at the U.S. Weather Service like this is a really bad idea.

Mr. Chairman, the National Weather Service Employees Organization would like to make the following recommendations:

One, that the contracted out Weather Service facilities in the State, upon expiration of the contract in 1984, be returned as an inhouse Government function and staffed by Federal employees.

Two, a clear, explicit mandate by Congress making the National Weather Service an independent agency, and the sole agency of the United States responsible for the acquisition, dissemination, analysis, and research and development of all meteorological information.

And three, legislation requiring congressional approval before any National Weather Service facility is sold, closed, or contracted out.

Thank you.

Senator GORTON. Thank you very much. Your original statement and the attachments will all be included in the record.

[The statement and documents follow:]

STATEMENT OF STANLEY W. MARCZEWSKI, NATIONAL VICE PRESIDENT, NATIONAL WEATHER SERVICE EMPLOYEES ORGANIZATION

"Everyone talks about the weather, but no one can do anything about it."

No one can do anything about the weather, but Congress can do something to prevent the Reagan administration's plan to dismantle over a century of Federal weather services. This administration is determined to contract out or sell the weather services to private companies.

I would like to take a few minutes to appraise the subcommittee that there are three (3) weather service facilities in Washington State that have been contracted out, the Weather Service Meteorological Observatories (WSMO) at Stampede Pass in the Cascades, at Quillayute Airport on the northwest tip of Washington, and the Weather Service Office (WSO) at the Seattle-Tacoma International Airport. These facilities were contracted out under the guise of economy when in reality it has cost the public more in lost services. As an example, the public can not telephone these facilities for any weather information as the commercial lines (attachment 1)[1] except for the line to contact the National Weather Service (NWS) electronic technician at Quillayute Airport have been removed.

The agency on many occasions prior to the contracting out of these facilities indicated to the public and to the Washington State congressional delegation that there would be no degradation of services. The only change the agency stated would be that the contractor staff would replace the Federal employees. Part of this is true, the contractor staff have replaced the Federal employees, but the services have been reduced or eliminated.

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[1] Various attachments have been retained in the committee files.

Prior to the contracting out of the Weather Service Office at the Seattle-Tacoma International Airport, the Federal employees provided approximately 250 pilot weather briefings per month. Another service was the large public contacts which averaged about 19,000 per year. In addition, the Federal employees aided in some of the warning dissemination responsibilities of the Seattle Weather Forecast Office. Also, the Federal employees provided for the Airport, short-term weather forecasts, such as fog dissipating, take-off conditions, snow accumulations, wind warnings and limited terminal weather forecasts. The Federal employees were responsible under the provisions of the National Weather Service operations manual, chapter D-36 to provide certain weather information to international aviation flights from the Seattle-Tacoma International Airport.

The only duties being performed by the contractor's staff are the taking of the weather observations and the preparation of the flight folders.

Under the appeals procedure contained in the OMB circular A-76, the National Weather Service Employees Organization (NWSEO) appealed the agency's decision to contract out these facilities.

The appeal for WSMO Stampede Pass (attachment 2) was received in the Department of Commerce on December 15, 1980. The agency's denial (attachment 2a) of NWSEO's appeal was rendered on February 10, 1981.

The appeal for WSMO Quillayute Airport (attachment 3) was received in the Department of Commerce on January 28, 1981. The agency's denial (attachment 3a) of NWSEO's appeal was rendered on May 8, 1981.

The appeal for WSO Seattle-Tacoma International Airport (attachment 4) was received in the Department of Commerce on January 28, 1981. The agency's denial (attachment 4a) of NWSEO's appeal was rendered on September 30, 1981.

The agency did not follow the provisions of OMB circular A-76 and the agency's review of NWSEO's appeal contained many irregularities. As an example, the appeals procedure in OMB circular A-76 states that there will be an expeditious determination within 30 days of the receipt of the appeal. The agency did not comply with this provision. In addition, the cost comparison for both WSMO Quillayute and WSO Seattle-Tacoma International Airport were compromised since the contractor was told by a staff member of the National Weather Service the amount to bid for the contract.

NWSEO wrote numerous letters to President Reagan, various Senators and Representatives, Mr. Stockman and to the agency about the irregularities in not following the circular. These letters as well as NWSEO comments to the Office of Federal Procurement Policy to the proposed revision to OMB circular A-76 are contained in attachment 5.

NWSEO is against the contracting out of any National Weather Service facility and specially the contracting out of National Weather Service facilities at major airports.

The contracting out of the National Weather Service facilities to a private profit-making organization improperly delegates the statutory functions of the National Weather Service of the National Oceanic and Atmospheric Administration, DOC. And at the same time, OMB is obligating the taxpayers by assuming the liability for the contractor for any erroneous weather observations that may result in an aircraft accident or other weather related disasters.

A district court ruling in a marine accident case, *Chanon* vs. *United States*, holds that erroneous forecasting is not negligent. It does, however hold that the National Weather Service must use "due care in gathering weather information, forecasting, and making available for broadcasting up-to-date weather information."

There are many weather disasters that have taken hundreds of lives in the past few years. Thirty-five percent (35 percent) of the aircraft accidents that take 1,200 lives per year in the country are weather related (attachment 6).

Two major weather related aircraft accidents occurred last year at facilities where the weather observations were contracted out, Air Florida at Washington National Airport and Pan American at New Orleans International Airport.

The Government retains liability for its contractors, even though it has no direct control over the actions of the contractor employees. The agency in the denial of NWSEO's appeal stated: "The contract does not require the contractor to have any particular liability insurance" * * * "That no Government personnel will supervise contractor employees, and that all supervision of contractor employees will be performed by contractor personnel.

The administration intends to contract out or sell the majority of the National Weather Service. The stories published in many newspapers (attachment 7) across the country in March 1983 about the administration's plan to sell the weather services and satellites was the first indication to the public that the administration's threat was real.

There were many newspaper articles and editorials (attachment 7) opposing the administration's plans. Mr. Ken Schram of KOMO radio and television in the following editorial which was aired on KOMO PM radio/television on March 8, and KOMO AM radio on March 9, 1983 summarized the consequences of these proposals:

"What's this we hear about the Federal Government wanting to sell the National Weather Service? Really now, is the Reagan administration serious? Apparently. Even as we speak there's a proposal on the President's desk to sell the country's land, ocean and weather satellites. There is consideration to either sell, or contract out, U.S. weather monitoring stations a well as weather analysis and forecasting operations."

"Why is the government thinking about 'privatizing' huge parts of the National Weather Service? Well, one reason seems to be that other nations are ahead of the U.S. when it comes to commercially exploiting satellites for oil exploration and agriculture. We ask, is that a reason to run the risk of jeopardizing the free sharing of weather information among 100 world countries? Is it a reason to risk hurting the work of professional weather researchers, or reduce the quality of weather data? Is it a reason to tearing apart a large part of the nation's weather service? Three 'is it's', three 'no's'! The Federal budget deficit is one of the rationales used by the Government in proposing this. Yet at an estimated cost of under $2.00 a year per U.S. citizen, the Weather Service gives us more than our money's worth. We all depend on the Weather Service for data and satellite photos for storm warnings and other information, all free of charge.

"This is one case at least where we need the Government to run something, and this proposal should generate a 'storm' of protest!"

The National Oceanic and Atmospheric Administration (NOAA) is very determined to implement the Reagan administration's plans. Mr. James W. Winchester, Associate Administrator of NOAA, has been appointed as the project officer to accomplish this.

The tool that Mr. Winchester and others intend to use in this endeavor is the Office of Management and Budget (OMB) revised circular A-76 which is scheduled to become effective on October 1, 1983. OMB circular A-76 is a procedure used by an agency to determine if services should be contracted out. The circular is not a mandate to contract out services. It appears, however, that Mr. Winchester is wielding the circular like a crowbar. In a memo dated January 19, 1983 (attachment 8), Mr. Winchester says: "In activities of less than ten FTE, the circular mandates that the activity be contracted out without a cost comparison." The proposed revision to OMB circular A-76 does not say that activities of less than ten full-time employees must be contracted out. This appears to be an administrative abuse of the circular for the express purpose of cutting the National Weather Service personnel roster with no regard to loss of services or to the cost to taxpayers to replace these lost services. Other discrepancies that have surfaced include the following:

1. On the same memo (attachment 8), Mr. Winchester sent Dr. Richard Hallgren, director of the National Weather Service, an "entire tentative list" of sites that should be contracted out. He directed Dr. Hallgren to perform a "complete inventory" of activities to see who would fall under the A-76 review for contracting out. Mr. Winchester said that these inventories "must rapidly come to an end so that we can get to work on the required reviews." He indicated that he should have "written comments no later than close of business January 27, 1983." This gave Dr. Hallgren a total of six working days to completely review the entire National Weather Service. That is an extremely short period of time to conduct a comprehensive review of an entire Government agency.

2. In the past five years, NOAA has convened four blue-ribbon panels to study the National Weather Service. All of these panels concluded that it would be unfeasible to contract out the National Weather Service, and that the National Weather Service needed more funding. In fact, the latest panel [1] had concluded that "The key to providing high levels of protection for the public and improved services to the economy is a strong central Federal weather service. * * *." This panel, along with the others, believes that contracting out of the National Weather Service would be a mistake. NOAA has rejected the recommendations of all of these panels, even though they approved the membership of each one. Booz-Allen & Hamilton, incor-

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[1] National Advisory Committee on Oceans and Atmospheres, 1982.

porated was awarded the latest NOAA contract to study the National Weather Service. Mr. Winchester intends to see that this panel will go his way. At a meeting of NOAA and National Weather Service administrators, Mr. Winchester commented that "We will control the outcome of the study, even if I have to meet weekly with them." It is now clear that Mr. Winchester's idea of controlling the outcome of the study is to ensure that recommendations will be made to dissolve the National Weather Service and turn its duties over to contractors.

An article entitled, "The Case Against Contracting Out" (attachment 9) was prepared and distributed by concerned individuals (in the Indianapolis area) and lists the reasons why National Weather Service facilities should not be contracted out.

The following is quoted from the oral testimony (attachment 10) of Mr. Leo Harrison, Jr., president NWSEO, before the Subcommittee on Natural Resources, Agriculture Research and Environment of the House of Representatives on March 9, 1983:

"On the subject of OMB circular A-76, the story this week concerning the administration's intent to dismantle the National Weather Service may be somewhat premature in the way it was reported, but this subcommittee should be concerned that the time frame used is the only error by the reporter. We hope that the members of this subcommittee will alert their colleagues that this abolishment of the MWS is a real threat. The Congress alone can prevent this. If the Congress is not disposed to the preservation of the NWS and a viable public forecast and warning system, then it would be left with only one rational act, and that would be the complete elimination of any Federal participation in public weather forecasting."

"Anyone who has followed the trend of the NWS is fully aware that since the Weather Bureau was changed to the NWS, the agency has continuously gone down hill in terms of human resources and in terms of the percentage of the NOAA budget that has been allocated to public weather services. We know there is a reluctance on the part of Congress to get involved in internal agency behavior and policy, but someone in Government must assume responsibility for the continuation of this degenerative trend. The GAO audit of the AFOS program should certainly have inspired further investigations * * * The taxpayers and the public are being bilked by the management practices within NOAA. They are paying for the best possible quality of weather forecasting. They are not getting what they pay for."

The following is quoted from the written testimony (attachment 11) of Mr. Leo Harrison, Jr., president NWSEO, given to the same subcommittee.

"Presently, NOAA leadership has commissioned a consultant firm, at a cost of nearly one quarter of a million dollars, to study wayt to gain more cost-effective operations in the NWS. This so-called Winchester study is in effect a cover to dignify station closures and personnel reductions in field operations and related public service, implemented A-76 contract out provisions, and establish user fees that would require the American people to pay their Government for certain services and information or do without."

President Reagan has proposed to establish a Department of International Trade and Industry and the establishment of NOAA as an independent agency.

In the NOAA administrator's letter No. 41 (attachment 12) pertaining to the establishment of NOAA as an independent agency, Dr. Byrne, NOAA Administrator, does not mention what role the National Weather Service will have in the independent agency. The current NOAA organization chart (attachment 13) shows the National Weather Service as a line component even though the NWS has a greater responsibility in providing weather services to the public.

NOAA takes approximately 17 to 20 percent of the NWS budget to administer the National Weather Service, yet NOAA does not contribute to the operational programs of the NWS. NOAA would like the NWS to lose its identity with the public. As an example, several years ago, NOAA directed that the name of the NWS Weather Radio be changed to NOAA Weather Radio.

The amount that NOAA takes for the administrative overhead can be eliminated, if at the time of the President's reorganization plan, the National Weather Service is transfered from NOAA and made an independent agency.

The National Weather Service employees organization's position paper entitled, "Why the National Weather Service should have single agency status" (attachment 14) was distributed several years ago to all Members of Congress.

Another concern of NWSEO is a possible conflict of interest or favoritism given to a private company by the National Oceanic and Atmospheric Administration.

In the midwest, the problem of the issuance of severe weather warnings by some radio and television stations possessing radar sets has caused a great deal of confusion among the public as well as frustrations to the NWS personnel. These stations not only try to beat their competitors but the National Weather Service as well.

The intent of Congress has been that the National Weather Service (among its other duties) issue severe weather warnings to the public. This intent has eroded over the past few years by the lack of action on the part of higher management.

This situation has prompted Dr. Kenneth C. Crawford, Meteorologist-in-Charge/Area Manager of the National Weather Service Forecast Office in Oklahoma City, to write a letter (attachment 15) to the Southern Region Director about the problem.

A firm named Weather Alert Radar Network (WARN), Inc., with headquarters at Gulfport, Mississippi announced its plans at a press conference on June 17, 1983 that it intended to install a master weather radar and broadcast station halfway between Tulsa and Oklahoma City. WARN Inc., intends to provide severe weather warnings to its paid customers. At a future date, WARN Inc., plans to issue warnings for heavy snow, ice, fog, etc. The higher management of NOAA gave its endorsement to this private venture at the press conference.

While the National Weather Service might expect to hear some criticism of its past performance from a company attempting to establish itself as a credible competitor, it certainly should not expect any such criticism to be tolerated much less expanded upon by NOAA, its parent agency. Yet, when the press conference was held in Oklahoma City, Captain Peter Gatje, U.S. navy, on detached service to NOAA, representing Mr. James Winchester, Associate NOAA Administrator, did indeed criticize National Weather Service performance, and did so using six-year-old statistics.

On June 24, 1983, Dr. Kenneth Crawford, Meteorologist-in-Charge/Area Manager of the National Weather Service Forecast Office in Oklahoma wrote a "Memo for the Record" (attachment 16). This letter documents the support that NOAA gave to WARN Inc., at WARN's press conference in Oklahoma City on June 17, 1983.

NWSEO was able to obtain under the Freedom of Information Act, the travel order and completed travel voucher (attachment 17) indicating that Captain Gatje was on official business representing Mr. James Winchester at the meeting with officials of WARN Inc.

On July 1, 1983, Dr. John V. Byrne, NOAA Administrator, sent a letter (attachment 18) to Mr. Leo Harrison Jr., President of NWSEO. The following is quoted from a portion of the letter:

"It has recently come to my attention that Mr. Peter Gatje, on assignment to NOAA, participated in a news conference in Oklahoma City held by W.A.R.N., Inc. It is alleged that Mr. Gatje made remarks critical of the National Weather Service at the news conference."

"I would like you to know that any remarks made by Mr. Gatje do not necessarily represent my views or the views of the National Oceanic and Atmospheric Administration."

The National Oceanic and Atmospheric Administration released on June 30, 1983, the Booz-Allen & Hamilton study. This was a contract study commissioned by NOAA for $235,000.00 to study the future role of the National Weather Service.

Newspapers published the story about some of the recommendations of the study. Mr. Ken Schram of KOMO television and radio in the following editorial which was aired on KOMO PM television and radio on July 7, and KOMO AM radio on July 8, 1983 alerted the public to the consequences of the recommendations of the Booz-Allen & Hamilton study:

"Everyone talks about the weather, but we don't like what the Government is considering doing about it. A study conducted by NOAA, the National Oceanic and Atmospheric Administration, recommends the U.S. Weather Service be cut back, way back. What would we lose? Well, one of the first things to go would be a majority of 269 U.S. Weather Service stations we now have. The report suggests cutting the number of stations down to as few as 25. That'd leave us with information on national weather patterns, but little, if any, data on what those national patterns would mean in local areas."

"We would also lose the weather radio. As it stands now, anyone can buy an inexpensive receiver, tune in any time, and get a local weather report. In some areas of the country, those receivers also sound an alarm, triggered by local weather stations, when there is threatening weather approaching. There is more."

"Farmers, sailors, pilots and business people would have to pay private companies for those vital weather services now provided by the Weather Service. Of course, that's assuming 'Randy's Rain Forecast' or 'Harry's Hurricane Alert' would find there's profit to be found in private meteorology. NOAA is going to take about a year to evaluate the report that recommends all that. We think, at the end of 12 months, NOAA should reach the same conclusion we've already reached: Hacking away at the U.S. Weather Service like this is a really bad idea."

The following is quoted from the western region staff meeting, July 5, 1983 and is a brief summary of the Booz-Allen & Hamilton study:

"The Booz-Allen study was released last Thursday. This is a contract study by NOAA for $235,000.00; it hasn't been officially approved by NOAA, thus should at this moment be viewed as a study which together with other studies, both internal and external may be used to fashion the future of the NWS. The study is based on outreach assumptions, (such as surface observations can be fully automated), thus reducing the NWS field organization to 25–50 forecast offices with attendant decreases of personnel. It proposes that the NWS mission be divided into two parts: The Core mission (public service and warnings) to be funded by Congress; and special mission (support to aviation, agriculture, etc.) which would be reimbursable, or provided by the private sector. A large role is proposed for the private sector, such as dissemination of NWS forecasts and providing special forecasts: NWR would be eliminated. FEMA would play the prime role in disaster preparedness. The general thrust of the study is faith that machines and computers can replace people (it will be interesting to see how well automated surface observing equipment does on cloud coverage, types of clouds, virga over the mountains, etc.). To sum, I don't know how significant this study will be in fashioning the blueprint for the future of NWS, but if it is, R&D has a tremendous challenge in the next 15 years. Further, the accent seems to be on weather products (produced by a computer), not weather service—and there is a huge difference."

The following has been compiled from reports done on the Booz-Allen & Hamilton study by NWSEO members, Joseph Kerwood and David Powell:

"The Booz-Allen & Hamilton, Inc., study of the NWS was commissioned by NOAA in 1982, and the actual study of NWS operations began in the fall. Completion of the study was accomplished in approximately 6 months, which, if you consider the overall NWS mission, is truly amazing."

"The facts and figures that are quoted, as well as the recommendations and conclusions contained within the study suggest that contracting out or 'privatizing' of weather services were underway prior to the completion of the study. To the untrained eye, it would appear as if the comments and conclusions of the report were pre-ordained."

"The Core mission does not include most special weather services currently provided. The study concludes that NWS services to other Federal agencies should be reimbursed by that agency, i.e., FAA reimburse for aviation weather services, marine services by the National Ocean Service, etc., which is based on the premise that the general public is not served by the agencies, i.e. agriculture, fire weather, air pollution, etc., that private sector meteorologists could be hired to serve the special services."

"The Core mission as seen by the study indicates that the general public is only interested in a general forecast which can be disseminated by the media. Any other requests for weather information would be from special user groups who could hire private meteorologists to obtain the information. This implies that only those that can afford to pay for weather information would be served, or that Federal agencies would either be required to pay for the information, or assume the forecast responsibility."

"I do not believe that the farmer who wants a forecast for hay cutting/bailing or planting and harvest, or a person putting a roof on their house or wishes to pour concrete, or persons wishes a travelers forecast should have to pay for that information from private sources. The study suggest that only a few, very large weather offices would remain, and with the large area of responsibility they would assume, the public would not be able to call for information."

"The second portion of the Core mission responsibility is watches and warning responsibilities which are of paramount importance. Severe weather watches and warnings are vital to the protection of life and limb. The study addresses the problem of severe weather warnings with the conclusion that State and local civil defense directors or emergency response networks and FEMA (Federal Emergency Management Agency) can handle the problem through the use of matching Federal funds. Then, the study concludes, 'the requirements for severe weather warnings provide a limit of 25 offices for the new field structure'."

"The budget for the Federal funded weather services, as listed in the study are:

	Amount in millions	Percent
Department of Defense	561	43
National Weather Service	285	22
National Environmental Satellite Data and Information Service	174	13
Federal Aviation Agency	146	11
NASA	66	5
Office of Atmospheric Research	52	4
Other	17	2

"As you can see DOD has the highest budget costs for weather information."

"The National Weather Service provides a great many services for less than $2.00 per year, per person. If you consider the weather useage and savings by the general public, the NWS more than pays for itself. Current field staffing of 3,950 people nationwide would be reduced to 2,192. To accomplish this, personnel would be rifed or transferred to other Federal agancies i.e., 621 personnel to aviation, 63 to marine agencies, etc. These people would continue doing the same job as before only in a different environment. The Booz-Allen study would have the NWS do the job more efficiently with less field people; however, the current management structure headquarters staffing of 988 would only be reduced to 969 persons."

"The study makes some good points that would be cost effective, such as consolidation of services and activities, but to suggest that a break-up of the NWS would be cost effective is pure rubbish. Consider the transfer of personnel from NWS to another agency. These people would be doing the same job, and additional funding would be required by that agency to support costs, data acquisition, research, etc. I can not see a great savings to the Federal Government or the American taxpayer. In fact, costs would probably be higher. Why rob Peter to pay Paul, when leaving the expertise where it is would be more cost effective."

"Currently NWS and FAA personnel are engaged in the taking, recording and dissemination of surface weather observations. These observations are the first step in the forecast process. Surface observations are also used for aircraft operations as they will determine if the airfield is open or closed to traffic. The Booz-Allen study indicates that full automation of surface observations will be available by 1988. The system (ASOS—automated surface observing system) should be completed by 1986 with development testing completed by 1988, and installation by NWS in fiscal year 1992. If the system proves reliable and can insure coverage of all needed parameters, it should be placed in operation, but what happens when the system goes down? Will the NWS have personnel available, on site, to insure that no loss of data will occur?"

"Booz-Allen study talks about Radar coverage, radars currently in use and under development. The study recommends that these radars be remoted to various 'superstations' where operation, observations and warnings will be issued, or that the radars would be automated and would be monitored from these stations."

"The proposal to automate the present NWS radar warning network is akin to having commercial airline companies use 'pilotless drone aircraft' to transport commercial travelers across the country. Computers evaluate only what they receive and have no reasoning capabilities. Thus, an erroneous input during periods of severe weather could result in disaster and loss of life and limb. The proposal to remote these radars, some as far as 200–500 miles from the center, is ill-advised and dangerous. Attenuation, scattering, AP, local interference, low voltage, etc., can all affect the final output on the radar display. Failure by an operator at a remote site) who must monitor several of these radars) to recognize these shortcomings could be disastrous."

"The present network allows for individual interpretation with real-time interaction, allows the operator to maintain close coordination with adjacent radar offices. Doppler radar is a vast improvement over our present conventional system, it also has similar limitations. We have all seen the results of computer malfunctions and realize the effects they have on such things as commuters, banks, military operations, space launches, etc. Can we afford to place our trust and lives in the hands of computerized, remoted radar?"

"The report makes note of the fact that several television stations and private firms have purchased radars and are using them in 'small' specific areas to provide significant warning lead time. Television stations with ample budgets have used radars for years to attract viewers and have in the most part cooperated with the NWS in disseminating warnings to the general public. Lately, some of these stations have gone so far as to issue severe weather warnings. This has lead to some confusion among the general public."

"The private firms referred to in the Booz-Allen study were not mentioned by name. Therefore, we can only comment on the one private firm called Weather Alert Radar Network (W.A.R.N.) which became operational one month prior to the release of the Booz-Allen & Hamilton study." * * * "In its promotional material, W.A.R.N. was highly critical of the National Weather Service network and staff, and stated that they could provide their customers a 20 minute lead time in a severe weather warning area of 4 square miles or smaller. When questioned about the limitations of their 5cm radar, especially during heavy rains, W.A.R.N. officials were evasive, and in most cases unable to provide an acceptable response to the various meteorologists and news media in attendance."

"The Booz-Allen study indicates that only 2 percent of the people use the NOAA Weather Radio. I don't know how this figure was arrived at, and can not contest. I can however defend the NOAA Weather Radio, and can recommend expansion of the network."

"The radio receivers are owned by:

"A. Private citizens who are selective users.

"B. Media—who broadcast warnings, watches and forecasts direct from their receivers to the public.

"C. Schools, business, etc."

"NOAA weather radio is covered by a policy statement issued by the Office of Telecommunications Policy, Executive Office of the President, on January 13, 1975, which used the system for enemy attack warning, and warning of natural disasters. The policy letters states: 'The NOAA Weather Radio will be the only federally sponsored radio transmission to the general pulbic'."

"The real losers if the recommendations of the Booz-Allen & Hamilton study concerning 'privating' or contracting out of weather services will be us, the general public, the American taxpayers."

National Weather Service employees continue to function under these conditions mainly because of strong self respect and professional pride in their products and services. Thus, two factors continue to save the field programs of the National Weather Service. These are, employees dedication to service, and the support we received from the Congress.

Mr. Chairman, the National Weather Service Employees Organization believes that the number one priority must be a clear, explicit mandate by Congress making the National Weather Service an independent agency, and the sole agency of the United States responsible for the aquisition, dissemination, analysis and research and development of all meteorological information.

The National Weather Service Employees Organization also requests legislation requiring congressional approval before any national weather service facility is closed or contracted out.

KOMO-TV EDITORIAL, JULY 7 AND 8, 1983

Everyone talks about the weather, but we don't like what the Government is considering doing about it. A study conducted for NOAA, the National Oceanic and Atmospheric Administration, recommends the U.S. Weather Service be cut back, way back. What would we lose? Well, one of the first things to go would be a majority of the 269 U.S. Weather Service stations we now have. The report suggests cutting the number of stations down to as few as 25. That'd leave us with information on national weather patterns, but little, if any, data on what those national patterns would mean in local areas.

We would also lose the weather radio. As it stands now, anyone can buy an inexpensive receiver, tune in at any time, and get a local weather report. In some areas of the country, those receivers also sound an alarm, triggered by local weather stations, when there is threatening weather approaching. There is more.

Farmers, sailors, pilots and business people would have to pay private companies for those vital weather services now provided by the weather service. Of course, that's assuming "Ranoy's Rain Forecast" or "Harry's Hurricane Alert" would find there's profit to be found in private meteorology. NOAA is going to take about a year to evaluate the report that recommends all that. We think, at the end of 12 months, NOAA should reach the same conclusion we've already reached: Hacking away at the U.S. Weather Service like this is a really bad idea.

What's this we hear about the Federal Government wanting to sell the National Weather Service? Really now, is the Reagan Administration serious? Apparently.

Even as we speak there's a proposal on the President's desk to sell the country's land, ocean and weather satellites. There is consideration to either sell, or contract out, U.S. Weather Monitoring Stations as well as weather analysis and forecasting operations.

Why is the Government thinking about "privatizing" huge parts of the National Weather Service? Well, one reason seems to be that other Nations are ahead of the U.S. when it comes to commercialy exploiting satellites for oil exploration and agriculture. We ask, is that a reason to run the risk of jeopardizing the free sharing of weather information among 100 world countries? Is it a reason to risk hurting the work of professional weather researchers, or reduce the quality of weather data? Is it a reason to tearing apart a large part of the Nation's Weather Service? Three "is it's," three "no's!" The Federal budget deficit is one of the rationales used by the Government is proposing this. Yet at an estimated cost of under $2.00 a year per U.S. citizen, the weather service gives us more than our money's worth. We all depend on the weather service for data and satellite photos for storm warnings and other information, all free of charge. This is one case at least where we need the Government to run something, and this proposal should generate a "storm" of protest!

[From the Federal Times, Aug. 22, 1983]

OMB Acts To Make Contracting Easier

(By Eric Yoder)

The administration is ready to issue a final policy that eases restrictions on converting federal jobs to the private sector.

The new policy will make it easier for agencies to contract out jobs but also will contain some protections for employees not written into proposed changes released in January, sources said.

Office of Management and Budget officials refused to discuss the final revisions to Circular A-76—the guidelines for contracting out commercial and industrial type federal jobs to industry—except to confirm that a policy has been approved and should be released soon.

Only a typographical error in the final draft and printing schedule problems prevented the guidelines from being issued in early August, sources close to the deliberations said. Changes were being made up to the last minute, but according to the sources, the policy will take the following shape:

A controversial provision on converting small functions to contract without comparing their costs to private sector bids will be softened. The January proposal would have required agencies to convert functions employing ten or fewer workers automatically. The final policy merely gives agencies the option of doing so.

The small functions could be converted automatically unless fair and reasonable prices can't be obtained from the private sector, as was proposed in January.

Larger functions also may be converted to contract without a cost comparision under the forthcoming policy. An agency could forego any cost study if the agency chief certifies that reasonable prices are available from the private sector and that the government would not have a reasonable chance of winning a competition.

Currently, cost comparisons must be held before contracting out any function costing the government $100,000 or more a year. Jobs are converted if a contractor can show it can do the work for at least ten percent less than the government.

Federal employee groups strenuously oppose waivers on cost comparisons. They say waivers ignore the purpose of the contracting out program—saving money—and believe the standards for the waivers are vague. Employee groups say people will lose their jobs needlessly and agencies will be disrupted through ill-founded decisions to issue contracts.

OMB dropped the requirement for automatic contracting of small functions after many agencies, particularly small ones, objected. They feared that they would have to contract out practically all of their commercial and industrial jobs, since those functions tend to have small numbers of employees in small agencies.

But the budget agency did not yield to objections about changing the threshold for studies from dollars to personnel. Federal employee groups and some congressmen told OMB they fear the government could lose control of functions responsible for millions of dollars a year.

A contracting official at the Defense Department, which has most of the government's 400,000 contractable jobs, said his agency plans cost comparisons for all functions considered for contracting regardless of the allowances in OMB's policy.

"There isn't going to be much time saved from not going through the cost comparisons. We realy don't see much value in that," the Defense official said.

Defense already is conducting an agency-wide efficiency review that involves many of the same steps as studies for possible contracting.

And the House Armed Services Committee has told Defense to "compile and make available to Congress actual performance figures" of all jobs that are contracted out. Similar language is expected to be adopted by both the House and Senate in a conference committee report to be issued in September.

The Defense official added that the cost-comparison process will be much simpler under the new guidelines. And agencies will need cost figures to answer potential appeals of decisions to contract out jobs, he noted.

The new policy restores some of the employee appeal rights dropped in January. Under the final policy, employees may ask the reviewing official to consider whether proper procedures were followed in deciding to grant a contract.

Those provisions are contained in current policy but the January proposal had said reviewers should consider only dollar costs.

In another clause that should aid federal employees, the new policy requires agencies to make functions as efficient as possible before the cost comparison. Under current policy, agencies are only encouraged to reorganize.

The efficiency requirement, advocated by federal employee groups, was in the January proposal. An addition since January encourages agencies to consult employees and unions while deciding on the most efficient in-house staff.

The final policy also requires that functions that win competition reorganize to the most efficient structure within 180 days. The January proposal required the agency to reorganize within a year.

Additionally, the final policy will make it clear that jobs it lists as candidates for contracting may be considered for conversion to the private sector. The January version left the impression that the jobs must be considered for conversion.

And agencies no longer will be encouraged, as they were in the January version, to consolidate functions for possible takeover by one contractor. Small businesses objected to that provision.

Still another change will delay by three years, to October 1987, the deadline for reviewing all contractable federal jobs for conversion to industry. OMB has been convinced that the original deadline was unrealistic.

An additional controversial provision abolished since January is one that would have mandated conversions to contract if errors were found in the government's bid. The clause was an attempt by OMB to produce better work from agencies, but many objected, saying it ignored the broader questions in a contracting decision.

Following the January proposals, the policy encourages contracting when the government plans to start a new commercial or industrial function or expand an existing one by over 30 percent.

OMB has worked on the guidelines for two years. A draft of a new policy was prepared in April 1982 but was withdrawn after strong objections by federal employee groups and by some congressmen. Pressure has forced OMB to miss a number of self-imposed deadlines since then.

Under the first version, the burden of proving efficiency was shifted from the potential contractor to the government. Agencies would have been allowed to keep contractable jobs in-house only if no satisfactory source were available in the private sector, if the function employed military personnel or if the government proved it could do the job more cheaply.

The first draft also changed the threshold at which cost studies need not be conducted from a dollar value—$100,000 a year—to a number of employees, 25. Nearly all functions employing 25 or fewer would have been contracted out without cost studies by September 1983. All new industrial activities would have been given automatically to the private sector.

A second draft was prepared in May, 1982. Under it, functions employing ten or fewer could be contracted out automatically. Agencies would have the option to conduct cost studies of functions employing between ten and 25 or go straight to contract.

The second version also dropped the requirement to give all new contractable jobs to industry. Otherwise, it largely echoed the first version. It too was stalled by opposition.

Finally in January of this year, OMB published proposed rules in the Federal Register. OMB solicited comments through the spring and reworked the policy through the summer.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION,
OFFICE OF THE ADMINISTRATOR,
Washington, D.C., April 21, 1983.

STANLEY W. MARCZEWSKI,
Vice President, National Weather Service Employees Organization, Renton, Wash.

DEAR MR. MARCZEWSKI: Your letter of March 23, 1983, to Secretary Baldrige has been referred to me for reply. We acknowledge your intent to file appeals in connection with the OMB Circular A-76 reviews of NWS activities. I have enclosed a list of those NWS activities to be reviewed.

The review process is slated to begin around May 1, 1983, and all reviews must be completed by September 30, 1984.

This information has already been provided to the NWSEO on March 30, 1983, in a letter to Mr. Leo Harrison from Dr. R. E. Hallgren, Acting Assistant Administrator for Weather Services.

It is much too early in the process to provide any cost comparison information, but when that stage is reached, I am sure Dr. Hallgren will be responsive to your requests.

Sincerely,

JAMES W. WINCHESTER,
Associate Administrator.

Enclosure.

OMB CIRCULAR A-76 REVIEWS NATIONAL WEATHER SERVICE

Activity and location

1. Regional Engineering: Garden City, N.Y.; Fort Worth, Tex.; Kansas City, Mo.; Salt Lake City, Utah.
2. Regional Engineering and Technicians: Anchorage, Alaska; Fairbanks, Alaska.
3. Weather Observations, Communications, and Technicians: Honolulu, Hawaii.
4. National Reconditioning Center: Kansas City, Mo.
5. Test and Evaluation Facility: Sterling, Va.
6. Overseas Operations Logistics: Silver Spring, Md.
7. Weather Chart Reproduction: Camp Springs, Md.
8. Instrument Shop: Silver Spring, Md.
9. AFOS Experimental Facility Technicians: Silver Spring, Md.
10. Office of Technical Services, Engineering Division: Silver Spring, Md.
11. Communications Operations: Suitland, Md.
12. Airport Weather Observations: New York—LaGuardia, N.Y.; New York—Kennedy, N.Y.; Newark, N.J.; District of Columbia—Dulles, Va.; Chicago (O'Hare), Ill.; Long Beach, Calif.; Los Angeles, Calif.; Fairbanks, Alaska.

Senator GORTON. Mr. Ramsey.

Mr. RAMSEY. Thank you.

By way of introduction, my name is Ray Ramsey. I've been presenting TV and radio weathercasts in Spokane and Seattle since 1954. Though not a graduate meteorologist, I have over 300 university hours, have taught school for 12 years, was a flying officer in World War II, currently hold the rank of lieutenant colonel, USAFR, retired.

Flying and weather go hand in hand. I have made a thorough study of both basic and advanced atmospheric science. I have spent literally thousands of hours at the Weather Service offices. I am thoroughly familiar with their past and present operations—from chartists to AFOS and their CRT screens.

I give six radio and four TV weather presentations daily, Monday through Friday, on KOMO TV/Radio, Seattle, Wash. We purchase the facilities over which is received the comprehensive National Weather Service weather loop, which serves us with local, State, and regional forecasts, hourly climate data, high/low, precip data for major local, State, and regional offices, marine forecasts, all types of warnings and advisories, river and avalanche forecasts, national temp summaries, summaries of the Nation's weather, extended outlooks of all kinds—in other words, a complete, ongoing, 24 hours a day, every day of the year, constant outflow of necessary and needed information. We also purchase the facilities to transmit the Weather Service's "Service A," which is an hourly aviation report from every major city around the country. This report includes sky conditions, current hourly weather, altimeter setting, temperatures, dewpoints, wind speeds and direction, barometer setting and tendencies, along with any pertinent remarks such as amount of precipitation within the hour, 3-hour, 6-hour periods, runway conditions, past and current unusual weather—anything out of the ordinary—along with the regular hourly data. Previously we leased a UPI printer which gave us the Goes West satellite pictures printed out every 15 minutes, which included 1-mile resolution, 2-mile resolution, enhanced sat pictures, full disc, channel moisture flow and the like. Currently we buy from ESD [Environmental Satellite Data]. This satellite picture is compatible with our graphic computer display. We purchase the service and the machines to transmit the information from the National Weather Service and that information is free for the asking.

I have spent countless hours discussing the vagaries of the weather, the potential, the dynamics, the causal factors, at all hours of the day and night—any day—weekends included. In all these years never once have I not been accommodated to the *n*th degree. Truly, the Weather Service personnel are, without exception, public-minded, enthusiastic Government employees anxious to serve the public in the best possible fashion at the least expense. They have always aided me in getting the most lucid weather information to the public. They are a unique and valued breed.

The Weather Service, as I see it, needs to be a monopoly, considering the interworkings of weather around the country and, indeed, around the world. To have it fragmented by competing private companies selling their wares is quite unthinkable.

Granted, one always works for greater efficiency and a better product, and competition is generally a healthy thing. But let it be among forecasters—even stations—to accomplish the best possible job. But not among separate and private weather companies.

Sincerely submitted, Ray Ramsey.

Senator GORTON. Mr. Ramsey, I'll start with you.

It is my understanding that KOMO and other similarly situated stations buy the facilities for receiving data from the National Weather Service, but that there is no charge for the data itself.

Mr. RAMSEY. That's right, as I said in the testimony. We pay for the facilities but we get all the information we need—and more—free.

Senator GORTON. Suppose you had to pay a private company for the data. In your opinion, how would that affect the weather information, the quality of the weather information which your audiences are accustomed to receiving?

Mr. RAMSEY. First of all, you have to decide which company is the prevailing company and which has the cheapest rate and which has the cut rate. And we could do it. You could actually make do. But it would seem to me—I know that if I want, at this present time, if I want some special information from Sea-Tac, I have to go around the corner. They don't want to be bothered. It's a contract operation.

As Mr. Marczewski noted, you really have nothing to verify whether it is correct information or if it's information of a contract employee who figures that will suffice.

There was an interesting thing—if I might just digress a moment here—it may be 4 years ago we had a water table crisis in the Yakima Valley. And some place, maybe from the Agriculture Department, came a weather forecast that said that the water table was going to be low and the farmers were in trouble. I was talking to Weather Service personnel and this forecast did not coincide with the national weather forecast, and I asked about the office—where did this come from—because these farmers were hiring well drillers to come out here at thousands and thousands of dollars to drill wells to augment the water supply during this drought condition, when in mid-fig [sic] they stopped—and don't quote me on the Agriculture—but it was something other than the Weather Service that was in conflict with them. They said, "Oops! We made a mistake. You have plenty of water in the water table," and this, that, and the other. It wasn't the Weather Service at this time. They were not aware of where the Agriculture got this particular bit of information that caused a number of lower Yakima Valley farmers to start drilling wells. Then they had to cease it, because there was, in fact, ample water storage in the tables. It was kind of a blatant thing there. It almost smacks of someone being competing with the National Weather Service—who I have a great affection for because I've never seen them hustle; they've always been there and they do it properly.

I think they're being penny-wise and dollar-foolish on this type of a move. But, then, you made a statement that it is already settled, which is a little disconcerting. You said it seems we're going to go this way, but we can have our say.

Senator **Gorton**. My statement was that it seems very unlikely that the weather satellites will be sold.

Mr. **Ramsey**. Oh, I misunderstood you.

Senator **Gorton**. In Congress, it's highly unlikely.

Now, let me ask you another question about your sources. In your nightly weathercasts on KOMO you list temperature and sometimes other conditions from places in the State of Washington which do not have National Weather Service facilities. What is the source of your information?

Mr. **Ramsey**. The National Weather Service.

Senator **Gorton**. You have Tri-Cities, for example, or Bellingham or something of that sort. Where does that information come from?

Mr. **Ramsey**. The National Weather Service. It comes right out on my—the weather loop I spoke about in the testimony. The thing of it is, I realize, even now, that they are—the National Weather Service is economizing, because with this automatic field operation service they can punch up—the National Weather Service can—data around the world. And, as Mr. Marczewski said, they've cut back a great deal. I mean, cut out the fat. We can all do that.

But this service that is so valuable—and it is available to everyone. And the thing of it is, I've seen commodity brokers, I've seen private people that do their own meteorology—where do they get it from? The National Weather Service. People that have—John Coleman, with whom I'm familiar—who does he go to? I mean, he's got the big weather net. The National Weather Service. He always checks with them. Dr. George, "Mr. Weather" in southern California—and he disseminates that information. He lives at the Weather Service in Los Angeles.

Senator GORTON. How would the quality of the service which you can provide be affected by the closing of some of the smaller weather stations?

Mr. RAMSEY. That is something for local agricultural people to decide. I can't speak to that. The only thing I would say is that this is one Government monopoly that should remain, I feel, mostly intact. As far as the smaller weather services in the smaller communities, the small branches of the Weather Service, that's out of my purview.

Senator GORTON. Thank you.

Dr. Reed, you said that it's important to have two polar orbiting satellites so data continuity would be preserved when one fails. I assume, of course, there are other desirabilities of having two. But let's look at the possibility of such a failure.

How long does it take to prepare one of these satellites for a launch and get it into orbit, considering launch failures, and how long—if we had only one and it failed—would we be without necessary services?

Dr. REED. It would be a minimum of 4 months, but likely much longer than that. We've had a recent example. Last November the Goes West satellite failed and it was June before a replacement was in operation. In that case there had to be a temporary, awkward repositioning of another geostationary satellite. But with a polar orbiter it would be worse, because the polar orbiting satellite contributes data used in making numerical weather forecasts. This data wouldn't be available in the event of failure for a very long period. This would affect, not only forecasting, but it would also affect the archiving of data for climatological purposes. So I would say 6 months or longer.

Senator GORTON. Do you know whether or not our defense agencies have a position on the question of one or two polar orbiting satellites?

Dr. REED. No, I'm not familiar with their position. Of course, they have their own separate satellites.

Senator GORTON. You mentioned in your written testimony that our area, the Pacific Northwest, lies downwind of a data-sparse ocean area. The Goes West satellite, for example, only goes as far north and west as Alaska. Would the Northwest risk being surprised by severe weather during such a data gap if we had only one polar orbiter?

Dr. REED. No, I don't think we would be affected, as far as the large, severe storms that come in from the Pacific. The geostationary satellites are the satellites most useful for that purpose. But the whole global system of observation and the performance of models globally would be affected. And, of course, polar forecasting would suffer as well.

Senator GORTON. On another subject, the AMS seems primarily concerned with maintaining free international exchange of weather data. The Commerce Department has proposed meeting this objection by Government purchase of the data from a private operator for free exchange with other nations. Do you think that we could honor adequately our international commitments in this way, or does it seem a sensible way of doing business?

Dr. REED. It seems a very complicated—a needlessly complicated way.

To put the matter in perspective; suppose we took all the different components of the weather observing system and sold them to private interests, and suppose that the hundred or more nations that are involved in the World Meteorological Organization also did the same. We'd have bedlam. This is a wrong step. We're putting a foot in the door here, where it shouldn't be put.

Senator GORTON. Do you know of any reaction on the part of other nations to this proposal?

Dr. REED. Yes. The Secretary General of the World Meteorological Organization, I understand, testified recently on this issue before a congressional committee. He reflected the concern of the whole world.

Senator GORTON. You spoke of the natural monopoly in this area and that the proposal would simply substitute a private for a governmental monopoly at greater cost. How would this necessarily result? Isn't it possible that a natural monopoly could be more efficient if conducted at less cost outside of the Government?

Dr. REED. I am not an economist, so I could not say it would be impossible. It's simply that the Government would still have to pay for the service it now provides and that it handles internally. And the private organization would have to make profit. So the same money would still have to be spent and profit would have to be added. But, in addition, the private firm would be in a position to raise prices both to the Government and to the various other private firms that depend upon this data.

Senator GORTON. And you feel that, for all practical purposes, in the Government monopoly we have a system that's being operated fairly and efficiently and in a cost-effective fashion?

Dr. REED. NOAA, and its subsidiary body, the Weather Service, are organizations that we should be proud of. These have been outstanding organizations. They've been in the technological forefront and they've done their jobs efficiently and well.

Senator GORTON. Mr. Marczewski, I got, as one of your recommendations, your legislative recommendations, that the Weather Service be taken out from under NOAA and made an independent agency. Why do you make—if my assumption is correct—why do you make that recommendation?

Mr. MARCZEWSKI. Ever since the National Weather Service stopped being called the Weather Bureau, and was put into different organizations, the mandated portions of providing the severe weather warnings has gradually deteriorated. The NWS is just a line component of NOAA. And NWS has to compete for money from Congress just as well as the other components of NOAA. And the recommendation was that if the NWS was an independent agency, the NWS would do what Congress has mandated, to provide the weather services to the American people.

Senator GORTON. Now, when the Government contracts for the private operation of the weather stations, what services are required from that private operator?

Mr. MARCZEWSKI. The only thing they contract for is the basic weather observations. They take the weather observations and make sure the observations are transmitted on time on the teletype circuits.

Senator GORTON. So they did not contract out all of the services which were being provided by the Weather Service when the Weather Service ran these stations?

Mr. MARCZEWSKI. That's right. Just as an example, at Sea-Tac Airport there were approximately 250 pilot briefings per month. And the public service contacts were about 19,000 a year. And these were all eliminated. What they did is, they took two positions, two tech positions, and transferred them to the Seattle Forecast Office as a backup to provide that service.

Senator GORTON. Has NOAA automated or proposed to automate any functions that you feel should not be automated?

Mr. MARCZEWSKI. Well, I would have to say on the surface observations, that there's a plan now to automate all the surface observations across the country. and the things like I mentioned, the ceiling, the amount of sky, the remarks section, have not been perfected yet.

Senator GORTON. So these are areas in which we don't have the technology sufficient to do it?

Mr. MARCZEWSKI. Right. They're working on it now, but whether they'll come up with anything that will be workable is yet to be seen.

Senator GORTON. When the technology is available it's an appropriate change?

Mr. MARCZEWSKI. I don't believe so, because you need the human element there to observe the weather. And also, there's no machine that will be able to give you the remarks of whether there's a thunderstorm approaching the field or not, or if visibility is reduced in one quadrant. I mean, there's a lot of information that an automated observation cannot give that the human observer can give you right now. The automated observations can give you the temperature, the dewpoint, the wind direction, the wind velocity and the altimeter setting.

Senator GORTON. Your second recommendation for congressional action called for legislation requesting congressional approval before the closing or contracting out of any weather station. Have you looked at the language included in the Commerce Committee's NOAA authorization to see whether or not it meets that recommendation? I can read it for the record.

> No Weather Service station or Weather Service forecast office of the National Weather Service should be closed or consolidated until the Secretary establishes appropriate standards, principles and procedures, including formal hearings, comment periods and public notice of intent or other appropriate means of presenting evidence, views and opinions relating to any proposed closure or consolidation.

Is that sufficient?

Mr. MARCZEWSKI. This is something that was just added.

Senator GORTON. That is the kind of thing we are talking about?

Mr. MARCZEWSKI. Yes; contracted out or sold. Because President Reagan has a plan of dismantling essentially the whole Weather Service by selling it to private companies, as well.

Senator GORTON. Thank you very much. I should like to thank you all.

The next panel is on marine aviation and weather, Mr. Hutcheon, Mr. Petersen, Mr. Jackson, and Mr. Jorgensen.

STATEMENTS OF DICK HUTCHEON, AREA MANAGER, NWS, SEATTLE; DENNIS PETERSEN, NORTH PACIFIC FISHING VESSEL OWNERS ASSOCIATION; BOB JACKSON, FORECASTER, NWS, SEATTLE; AND ROBERT JORGENSEN, PRESIDENT, HORIZON AIRLINES

Mr. HUTCHEON. I am here as area manager for the State of Washington. I am responsible for all services provided by the National Weather Service in the State. It is a pleasure for me to appear before this committee to testify about marine weather services and our NOAA weather radio program.

The marine forecast program is a large and important program. Products and services provided to users in the State of Washington include coastal and inland waters forecasts and warnings, harbor bar forecasts, input to the oceanographic monthly summary, marine climatology and data, tsunami watch/warning dissemination, preparedness/awareness, and oil and hazardous material spill response.

Along with these services goes an array of supporting activities which focus on contact with users to determine needs, improving data base and forecast techniques to fulfill these needs, and improving communications to insure products are received by the users in a timely and reliable manner.

The impact on marine operations of winds and seas is fairly obvious, so I will not go into detail of the value of these products. However, as an example of the usefulness of this program, I will describe briefly two other products that are made by the Weather Service Forecast Office [WSFO], Seattle, for the fishing community. The first is the Grays Harbor bar forecast, which is produced and disseminated daily and is based upon tidal currents, observed and forecast swells and wind/wave conditions. The fishing vessels at Westport must, of course, cross the Grays Harbor bar in order to leave the harbor. At times this bar can be extremely hazardous. Feedback from fishermen has indicated that bar condition forecasts are extremely useful in their operation. Ninety percent of the fishermen replying to a recent survey indicated they were helpful or very helpful in planning their bar crossing. They indicated that this information allowed them to determine if they should leave the harbor, and, if out, how they should plan their return with regard to tides or if they should seek another harbor.

The second product is the sea surface thermal analysis produced once a week by the forecast office. This product is an analysis of existing sea surface temperature conditions based upon satellite observations and ship and buoy reports. Last year's survey by the

NWS after the fishing season indicated that individual fishermen saved up to $16,000 and saved as much as 5 days' searching time because of this product. In addition, fishermen commented that these products saved 30 percent and untold man hours in operating costs and time. This product provides the fishermen with information on the location of strong sea surface temperature gradients, which are usually areas of high nutrients and therefore good fishing. It allowed them to go more directly to the areas where the best fishing could be expected. These are just two examples of specific ways in which the marine forecast program provides information that has an impact on the operations of marine users.

Satellite data is vital for assessing the marine impact of storms approaching from the Pacific. Observations from buoys are also a key ingredient in issuance of timely forecasts and warnings.

One of the ways we disseminate weather information is though NOAA Weather Radio [NWR]. NWR is a continuous 24-hour-a-day, VHF-FM broadcast of weather information.

The broadcasts originate from NWS offices and are updated as soon as new forecasts or information becomes available. We have seven NWR transmitters in the State of Washington and three others in adjoining States that broadcast into the State. Approximately 90 percent of the population of the State lives within receiving range of a NWR broadcast. While we have no exact count as to the number of listeners, an example of the response given to a late November and early December survey may give some idea. We received nearly 300 requests from listeners for a small brochure describing our programing. Radio station managers generally estimate 1,000 listeners for every 1 that responds. If this is true, we have nearly 300,000 NWR listeners in the Seattle and Neah Bay areas alone.

We provide, on NWR, weather information that is not available elsewhere. For example, commercial fishermen can turn on their NWR while getting ready for the day's activity at 4 a.m. and within a period of 5 or 6 minutes get a complete update of existing and forecast conditions. For 3 hours in the early morning and early evening we also broadcast a narrative description of the sea surface thermal boundary analysis.

Steelhead fishermen can receive, during the time period 4 a.m. to 8 a.m., from December 1 to March 15, river stage reports which allow them to make the decision where to go steelheading. Recreation enthusiasts can receive current and forecast conditions for Washington mountains. During the winter months avalanche information and warnings as well as pass reports are available.

There are more recreational boats per capita in this area than any other part of the country. Many of these boaters have NWR and listen regularly. Marine forecasts and warnings are available to boaters 24 hours per day on NWR. Several of the dock facilities in the area have systems which also allow boaters to hear NWR broadcasts. Letters from recreational boaters indicate NWR is a valued service.

The weather information on NWR is so valuable to the agricultural community in Yakima that funds to set up this station were donated by agricultural interests. Growers have instant access to the latest weather forecasts and can be alerted if frost threatens.

NWR is an invaluable warning device. It has a unique feature which activates specially equipped receivers in homes and offices by simply pushing a button in our office. When threatening weather develops, we can alert emergency services officials, county and local officials, as well as the general public.

In summary, we have a wide variety of NWR radio listeners that use this system to get valuable information. Many would have no other method of obtaining the information when needed.

This is a very brief sketch of our marine and NWR activities. I will be pleased to answer any questions.

Senator **Gorton**. Thank you, Mr. Hutcheon.

Mr. Petersen.

Mr. **Petersen**. I am Dennis Petersen of the North Pacific Fishing Vessel Owners Association, which represents the majority of the king crab, tanner crab, bottom fish fleet fishing in the North Pacific and the Bering Sea. As you can well imagine, the weather and its forecasting is very close to our hearts. What I would like to do is briefly read a statement submitted by Bob Alverson from the Alaska Marketing Association, which is the marketing arm of our fishing fleet:

> This brief letter will express our support for continued funding for the National Weather Service program administered by the National Oceanic and Atmospheric Administration.
>
> The weather services are critically needed by the commercial fishing fleet for the following reasons, specifically in the North Pacific and the Bering Sea.
>
> One: the services provide weather information that is relayed to the fleet. This information is * * *

Well, I'm glad I didn't write this.

> The information that is provided to our fleet in the North Pacific is absolutely, unequivocally, critical to the safety of vessels and the crews in determining their periods of fishing, how to load their vessels with cargo, and how to load the vessels with fishing gear, and specifically crab pots
>
> As has become very, very apparent in this last year, with the high loss of vessels in the North Pacific and the Bering Sea area, that weather and its ramifications have very severely determined our fishing fleet's operations and will probably be doing so more in the future.
>
> Two: the weather information enables a skipper to maximize his fishing time and minimize the risk to his vessel.

And as being a skipper, a fishing vessel owner, skipper and fisherman in the Bering Sea for the last 17 years, I can't emphasize enough how we rely on our twice-daily weather information. We receive information through the Kodiak office—the lady's name is Peggy Dyeson—and we receive this weather at 8 and 6 every day. And at these particular times I'm sure that just about every vessel that is fishing in the North Pacific and the Bering Sea has his radio tuned to this particular frequency and that that particular time it's as if somebody took a curtain and shut all of the outside radio interference off, because everybody quits talking to listen to Peggy Dyeson's radio.

The severity of the weather that we encounter in the North Pacific dictates that, in commonsense, we do this. And it is every captain's usual procedure to have breakfast before 8 so he can listen to this weather forecast.

If the Weather Service information were eliminated it would severely affect especially the smaller vessels. in our fleet. And the smaller vessel fleet is the marginal vessels that are fishing in our area; I'm talking about our association members. They have, naturally, a higher concern as to what they're going to be facing during their day's fishing. And, were they not to receive this, they would not be able to make intelligent decisions as to whether they should be out in that weather or not.

"The Service provides surface temperatures for our fleet which is helpful in locating feed and various species of fish." As our fleets become more and more—come more and more into the bottom-fish and mid-water industry it is becoming readily apparent to our skippers that feed patterns and surface temperatures are very important in dispersion of fish, and hence that is also a very, very valuable service and becoming more so.

The argument against charging a user fee for this service is as follows: the service provided is for the benefit of many users in the nation both in a direct form and an indirect form. It is, no doubt, an aid to commercial fishermen, freighters, yachts.

And I have also fished on the coast of Washington with a salmon trawler, and am glad to have had this opportunity to thank those that are concerned with putting out the weather information for their consistent and good weather forecasts. We depend on those daily.

"It is an aid to commercial fishermen, freighters, yachts, sport fishermen, national defense, farmers and universities conducting experiments. And of all these user groups it would be very hard to determine which one would pay equally for the cost of the satellites and the vast communications networks required for the service.

Also, as you are well aware, the North Pacific and Bering Sea fishermen are presently undergoing severe stock limitations. Their capability of paying for a service such as this for the next 4 or 5 years would be severely limited.

"The Weather Service is a national benefit to commerce, the general citizen and for the national defense and should be paid for by the Nation as a whole."

If there are any questions I'd be very happy to answer them. Thank you.

[The statement follows:]

STATEMENT OF ROBERT D. ALVERSON, MANAGER, ALASKA MARKETING ASSOCIATION

Gentlemen, on behalf of the Alaska Marketing Association and the Fishing Vessel Owners Association both of Seattle, which represent halibut and various crab vessels. This brief letter will express our support for continued funding for the National Weather Service program administered through the National Oceanic and Atmospheric Administration.

The weather services are critically needed by the commercial fishing fleet for the following reasons, specifically in the North Pacific and the Bering Sea.

1. The services provide weather information that is relayed to the fleet. This information is critical to the safety of a vessel and the crew when determining how much cargo to load, or heavy fishing gear to transport.
2. The information enables a skipper to maximize his fishing time and minimize risks to the vessel.
3. The weather program provides information for fishermen in the Bering Sea for ice flow conditions, which are critical for fishermen when they set gear.
4. The weather service information if eliminated could severely affect the smaller vessels in the Alaskan fleet as their capacity to withstand adverse weather conditions is less than larger vessels.

5. The service provides surface temperature for the fleet which is helpful in locating feed and various species of fish.

The argument against charging a user fee for this service is as follows:

1. The service provided is for the benefit of many users in the nation both in a direct form and indirect form. It is an aid to commercial fishermen, freighters, yachts, sport fishermen, national defense, farmers and Universities conducting experiments. How would all these user groups pay equally for the cost of satellites and the vast communications network required for this service.

2. The weather service is a national benefit to commerce, the general citizen and for the national defense and should be paid by the nation as a whole.

If there are any questions please contact the above office. Oral comments in Seattle will be presented by the North Pacific Fishing Vessel Owners Association, tentatively at this time by Dennis Petersen.

Senator GORTON. Mr. Jackson.

Mr. JACKSON. Mr. Chairman, my name is Robert Jackson and I'm a meteorologist assigned to the Weather Service Forecast Office in Seattle. In addition to my responsibilities as an aviation forecaster, I also serve as the Weather Service Evaluation Officer responsible for the quality of aviation services provided by the National Weather Service in the State of Washington.

I appreciate this opportunity to come before this committee to testify on our aviation weather services.

The objective of our aviation program is to provide weather forecasts, warnings, and advisories to commercial and private aviators for safe and efficient flight operations.

Specifically, our programs include the preparation of terminal forecasts for 12 major airports in the State, 3 terminal forecasts for international air carriers, 9 aviation route forecasts for our major air corridors, and 1 aviation weather synopsis 3 times each day describing statewide aviation weather conditions.

The National Weather Service also staffs a Center Weather Service Unit in the Air Route Traffic Control center to provide direct weather input to air route traffic controllers. In addition, all our Weather Service offices in the State provide local pilot weather briefings and services for their respective areas. At the Weather Service Forecast Office here in Seattle, a continuous, 24-hour a day weather watch is maintained by the aviation forecaster to insure that flight weather information is kept current. It is important that warnings of en route weather conditions related to icing, turbulence, and winds aloft be issued in a timely manner. Forecasts and warnings are updated and amended when there is a significant change in the weather conditions affecting aviation.

Obviously, the success of this effort hinges to a large degree on accurate and timely around-the-clock reporting of weather conditions by National Weather Service observers stationed at our weather offices in the State, and by FAA flight service station weather observers. Reporting of current weather conditions and forecasting of future weather conditions at our airdromes are absolutely essential to safe aviation operations. The terrain in Washington State includes coastal, inland marine, mountains and desert. The climatic regimes include rain forest, maritime, alpine and arid. The Cascade Range is a formidable barrier to east-west aviation traffic. There are only a few passes that are considered "safe" for light aircraft when weather conditions are marginal. Many private pilots rely on visual flight conditions or VFR. Therefore, our observations and forecasts are vital to their safety.

Because of the paucity of weather observations, we make especially good use of weather satellites for the detection of rapidly developing thunderstorms along flight routes. Satellite data is also most useful in evaluating developing weather situations off the Washington coast. Added to our arsenal of weather monitoring systems are long-range and local-use radar and the automatic lightning detection system operated by the Bureau of Land Management.

To insure that observations are accurate and timely, the National Weather Service maintains a very active quality control program that not only evaluates the accuracy of observations but also the quality of our service to the aviation community. These functions are carried out by a staff of quality control officers in our regional headquarters and by the Weather Service Evaluation Officer at our Seattle office.

Pilots are strongly encouraged to get a pilot weather briefing before each flight. This briefing tells the pilot the existing and forecast weather conditions for his or her route of flight. Pilot weather briefing is a function shared by both the FAA and the National Weather Service. Where the FAA has located a flight service station, they handle most of the briefings using our forecasts, with the NWS handling referrals from the FAA or those pilots requesting a NWS briefing. In those locations where the FAA does not have a facility, the NWS handles the briefings. For the year ending May 1983, there were more than one-quarter million pilot weather briefings done in the State of Washington. These briefings include those done face-to-face and by telephone, and are complemented by mass media methods. The mass media methods include the Pilot's Automatic Weather Answering Service [PATWAS] and the Transcribed Weather Broadcast [TWEB]. These continuous recordings are preflight weather briefings for local and limited cross-country flights and are updated when necessary. The TWEB is especially useful since it can be received by radio while in flight.

Sir, I hope it is clear from this testimony that weather services provided to the aviators must be more specific in detail than that provided to the general public. When the public forecast calls for "increasing clouds tonight," the aviation forecast must tell the pilot exactly what time the clouds are expected to increase and at what altitudes.

Combining these requirements with the varied terrain of the State of Washington does present some complicated problems for the meteorologist to solve. The development of a forecaster's capability to integrate exacting details with the geophysical characteristics of a State like Washington takes much training and dedication and draws on all of the resources of the National Weather Service.

There are three major aviation user groups—commercial, private, and sport. There are 22 commercial air carriers that fly Washington skies. And by the way, Federal regulations require that a terminal forecast be written and kept current for any airfield used by these commercial carriers. There are 27,000 licensed pilots and more than 7,000 registered light aircraft in the State. In the interest of flight safety, our weather forecasters carry on a very active program of providing seminars and hangar sessions for interested pilots.

Sir, the aviation industry depends heavily on weather conditions both observed and forecast. The National Weather Service's aviation program is dedicated to providing the best possible service 24 hours a day for all aircraft, from the single seater ultralight to the largest jet transport.

Thank you for the opportunity to testify today. I will gladly answer any questions.

Senator **Gorton**. Thank you, Mr. Jackson.

Mr. Jorgensen.

Mr. **Jorgensen**. Committee members, I am Robert Jorgensen, senior vice president and chief operating officer of Horizon Airlines. I would like to especially express my appreciation to all of you on the committee for allowing me to testify today.

I wish to open my testimony by saying that I have been active in the aviation sector for the last 43 years of my life, and during that time I have constantly used the National Weather Service as a member of airline management and as a pilot. The profound contribution of the National Weather Service has been one of the key factors in the gigantic advancements in aviation through these short years. The growth of the aviation industry in this century has not been paralleled by any other industry, large or small. Only recently has the growth of the computer industry even closely matched the growth of aviation.

My reason for discussing this very outstanding growth is to impress on each of you that none of this would have been possible without the first class, superior, high quality, and cooperative Weather Service of the United States of America. Gentlemen, can you imagine a 747 commencing a transcontinental flight without the highly sophisticated weather reporting that is available to us today?

Terminal weather forecasts, area weather forecasts, forecasted winds aloft, upper air weather charts/maps and pilot reported weather from airborne aircraft are the very backbone of our great industry. Without this information, we are grounded. Each pilot must have this information available in order to plan a safe flight from takeoff to landing. The very high degree of accuracy in forecasting the high level winds allows the domestic airlines to save millions of gallons of fuel each year.

The National Weather Service makes available the following: terminal forecasts, area forecasts, forecasted winds aloft, upper air weather charts and maps, constant updating of actual weather from pilots of airborne aircraft through the air traffic control system to the National Weather Service. Without this service we could not plan or execute a safe flight.

In our Pacific Northwest we are blessed with beautiful but very treacherous mountain ranges and valleys. This natural phenomenon requires even greater weather reporting for safe navigation than the flat, open countryside.

The question before us is: Should this Weather Service be automated at this time? I am informed that only temperature, dewpoint, wind direction, wind speed, and altimeter settings can be automated. This will not provide enough information. We must have actual observations of ceilings and visibilities, plus a myriad of weather combinations that restrict visibility—smoke, haze, et cetera—plus remarks that are required in making good surface weather observations. I suggest we do not automate the total Weather Service, but rather use the present state of the art in automation to enhance our present very excellent national weather reporting system, and in no way reduce it.

The next question is: Should we reduce aviation weather services as a public responsibility and contract the private sector to provide this service? I feel this is not justifiable at this time for the following reasons:

The financial burden on the present weakened aviation sector would be very unfair at a time when the airlines are still adjusting to the many ramifications of deregulation, and very large numbers of airlines are new in the industry with very little financing.

The present weather network is the product of many years of structuring a complete network over the total U.S.A. This could not be accomplished by individual small area weather services. It would require one large national network composed of hundreds of small stations—and who would substantiate the integrity of this service to guarantee the safety we have today?

Who would set and manage the very strict standards that would be required of this private sector weather service? Who would license the weather observers? An agency of the National Weather Service would have to set and police this high standard.

In conclusion, may I suggest that we continue our very sophisticated and successful Weather Service and use automation only where it will enhance the Service, but not replace it.

I thank you very much for giving me the opportunity to express my views on this very important subject.

Senator GORTON. Thank you very much, Mr. Jorgensen.

Mr. Petersen, starting with you. As you know, suggestions have been made from time to time to eliminate NOAA's weather radio service, based on the premise that relatively few people—or very few, sometimes—use the service. What is your view on that? How reliable, accurate and important are those services?

Mr. PETERSEN. Thank you very much; perhaps that's a question I didn't touch on enough. Basically, the fishermen in our fleet depend on the weather broadcasts like they would any other navigation instrument, like they would use radar, like they would use Loran. It is part and parcel of making intelligent decisions on how you're going to operate your vessel safely. I guess, without such a service, at least in our particular area, where there is an individual listening for vessels reporting back after her Weather Service report is given, and in individual areas without that ability you would have a lot of chaotic conditions, and especially where tugboat operators are concerned. There is not, that I know of—and I've been in fishing since I was 12 years old—that since this service has been available, that there has not been a vessel that I have been on that the captain has not utilized that service. It is extremely important; it is effective, and without it we would be in serious trouble.

Senator GORTON. So you are saying every captain uses it?

Mr. PETERSEN. Without a doubt. Every captain that makes an intelligent decision uses this; yes.

Senator GORTON. Mr. Hutcheon, beyond the commercial marine, I assume that it's used a great deal by pleasure boaters; is it used by anyone else?

Mr. HUTCHEON. Well, as I mentioned in my testimony, weather radio broadcasts cover about 90 percent of the population of the State of Washington. These are inland areas as well as marine areas. And we have a wide variety of users. The users range from the marine community and recreational fishermen to mountaineers from Seattle, steelhead fishermen, to growers in the Yakima Valley. It just goes on and on. Plus the emergency services people and folks like that.

Senator GORTON. Mr. Petersen, is this a field which the private sector could adequately service?

Mr. PETERSEN. I feel very comfortable in answering that. When you have a system that has worked as effectively and over such a long period of time you would hate to see any finagling with that particular system. And in answer to that I would say: I doubt it.

Senator GORTON. Mr. Jorgensen—and I guess Mr. Jackson with this—how would aviation advisories be affected if smaller weather stations were closed?

Mr. JORGENSEN. Well, I would like to explain our consideration is that in flying into these smaller stations we are definitely dependent on the true observation of that weather at that particular station, because before we can leave our first station to go to this station, we do not only want to know where the front is moving and the cloud formation and so forth, but an actual observation at that station by someone that is familiar with the area, of the cloud movements and so forth—just having an eye that's looking straight into the sky, looking at ceiling—there might be a cloud approaching at the end of the runway that's monstrous and if he can tell us ahead we will plan our flight to the alternate immediately and save this fuel, rather than go down and take a look at it. So it's very important to us.

Mr. JACKSON. In addition to what he just said, it is very handy for the aviation forecaster or any forecaster, as far as that goes, to be able to call up the person that's making the observation and ask questions: What's happening to the cumulonimbus or to the thunderstorm that's down to your south? Is it moving? Is it standing still? Is it moving toward you or away? Is it dissipating or is it building?

Unfortunately, you cannot ask a machine that. And also, it's the weather observer who has seen the weather the last hour, and has seen how it has changed, hour by hour. And very often, his eye, looking out the window, however remote it is from you, is almost as good as me looking at it myself.

Senator GORTON. Can you tell me how the quality of aviation observation services are determined and maintained, and how the contractor-operated stations would be required to meet the same standards?

Mr. JACKSON. The quality of the observations themselves is maintained through a national program that's directed at Asheville, N.C. And it does filter down to the region. But for the contracted observations, they are sent to the region and checked at the region and sent on to Asheville. And, unfortuntely, I'm not as familiar with the contracted aspect of it as I am with the regular Weather Service part.

Senator GORTON. Perhaps Mr. Jorgensen can tell me whether he agrees with Mr. Marczewski's assessment that contractor-operated stations do not provide adequate aviation advisories.

Mr. JORGENSEN. I have no instances that I can quote of inadequate information, but certainly if it's going to be turned over to the private sector I would be very concerned about the type of regulation that would be imposed to be sure that it is authenticated, that it is policed. Because we depend—our total operation and the lives of our people are dependent upon it.

Senator GORTON. What do you think the primary arguments against the disseminating of NOAA weather information via commercial communications channel, completely?

Mr. JORGENSEN. Well, the NOAA information is possibly not as important to us as all the other myriad of information. It is important, it's one of the pieces that we put together every morning, but it's certainly not the only one. And it is one of the lesser ones, possibly, for us.

Senator GORTON. With that, I would like to thank the four of you. Mr. Hutcheon will be back later. And I thank you very much.

Now, following Panel No. 4, we will have Panel No. 3, Mr. Graves, Mr. Enbom, Mr. Aronovitch, and Mr. Bledsoe.

STATEMENTS OF BUD GRAVES, METEOROLOGIST IN CHARGE, NWS, YAKIMA, WASH.; GAYLORD ENBOM, ORCHARDIST; BARRY ARONOVITCH, METEOROLOGIST IN CHARGE, NWS, OLYMPIA, WASH.; AND STEWART BLEDSOE, EXECUTIVE DIRECTOR, WASHINGTON FOREST PROTECTION ASSOCIATION

Senator GORTON. Mr. Graves, we'll start with you.

Mr. GRAVES. My name is Bud Graves, and I'm in charge of the National Weather Service office at Yakima.

My responsibilities include operation of the Agricultural weather service program that we provide in the Yakima Valley. Today I have the privilege of describing that service and the overall agricultural weather programs as they exist in the State of Washington.

As you know, farming and weather go hand in hand. Weather is one of the most important factors that determines the type of crops that can be grown profitably in an area and is one of the most influential factors considered in day-to-day farming operations.

The National Weather Service supports the agricultural industry in the State of Washington through two major programs. First, we provide a network of stations throughout the State that make observations of weather elements important to growers and others. Second, we maintain an agricultural forecasting service tailored to the needs of the agricultural industry in areas where growers are most capable of dealing with the impacts of weather. Both of these services are available to all growers—from the backyard gardener to the small family farmer to large corporate farming ventures.

Let's take a look at the observation program. We maintain a statewide weather observing network that makes observations of weather elements vitally important to farmers. This information is consolidated at the National Climatic Data Center, Asheville, N.C., into summaries both readily available and meaningful to users. The summaries are used by farmers to correlate their successes in growing different crops statewide and, on the other side of the coin, can be searched for clues that may lead to explanations of crop failures. Agricultural researchers make frequent use of these data in their studies designed to assist farmers.

Two different types of specialized agricultural weather forecasts are provided in Washington by our agricultural meteorologists at stations in Wenatchee, Yakima, Walla Walla, and in Portland, Oreg. It is important to note that we provide a public weather forecast service for the entire State, with predictions up to 5 days in advance. Longer range outlooks up to 90 days in advance are also issued periodically. These forecasts are general in nature, though, and many times these general forecasts do not answer questions vital to ongoing farm operations—questions such as, "Should I get my frost protection system ready? "Is it OK to cut my hay?" "Can I wait 2 or 3 days to plant my wheat?" "Is this the most effective time to apply sprays or fertilizer?"

We have established various agricultural weather forecasting programs in the central and southeastern portions of Washington in response to these grower needs. Freezing or damaging temperatures were early recognized by growers as conditions they could protect their crops against, if given sufficient warning. The first program to be established, then, was the spring fruit frost forecast. While it is still called the fruit frost program, growers of other crops sensitive to cold temperature damage are also serviced by the program. In the State of Washington, growers of grapes and various row crops make use of these forecasts.

To sense what happens during a typical spring frost protection season, and grasp what the national weather service's fruit frost program means to growers, let's take a look at what a typical fruit grower has to do during the late winter and spring months.

During the late winter season, the grower is most concerned with finishing up his pruning program and getting ready to put on various herbicide and pesticide spray. As spring approaches, fruit buds emerge from winter dormancy, becoming increasingly susceptible to cold temperature damage. As part of their job, agricultural forecasters remain keenly aware of the temperatures that will do damage to fruit buds. If a threatening situation appears, they will issue special statements, aimed at growers, warning them of the situation and advising them to get their frost protection systems ready for the season.

After the fruit grower has his protection system ready, he next asks, "How cold will it get in my area tonight?" This brings us to the essence of the fruit frost program. When fruit buds have advanced to the stage where they are susceptible to cold temperature damage, usually in March or early April, fruit frost forecasts are issued each evening. These forecasts give specific minimum temperature forecasts for a number of locations in each fruitgrowing region for the upcoming night. This type of information is not available from general public forecasts.

These difficult forecasts are made utilizing the entire spectrum of support that is provided both within our agency and from outside. Typical of the latter are special satellite interpretation messages provided by analysts at the San Francisco Satellite Field Service Station. These keep us abreast of events that only satellite systems can detect—changes that can strongly influence minimum temperatures.

In addition to the specific minimum temperature forecast for the upcoming night, outlooks for minimum temperatures over the next 2 to 5 nights are given. The grower needs this information to plan how to stretch his resources through what may be a number of cold nights. Knowing what to expect in his area, the grower can make last minute decisions about how he will battle the upcoming cold temperatures. Laborers may have to be hired, heaters filled with oil, sprinkling systems readied, et cetera. Finally, he is ready for the night and making plans for upcoming days' and nights' work, depending on the forecasts. This process continues until the end of the frost protection season, usually the mid to latter part of May in Washington.

For the remainder of the growing season, our forecasters are available to the agricultural community for advice on spraying and harvesting weather, et cetera.

Recognizing that the agricultural industry has needs for weather information in addition to fruit frost, the National Weather Service recently embarked on an agricultural advisory program at Walla Walla and Wenatchee for growers in their area. These advisories give detailed weather information and forecasts of weather elements considered important to other segments of the agricultural community. This program addresses hay, wheat, peas, onions, et cetera, as well as fruit. The advisories are issued daily throughout much of the year and put the forecast into terms of the expected impact on farm operations and crops, much like the fruit frost program does for fruit growers.

This gives a thumbnail sketch of the agricultural weather services available to farmers in Washington. It is a pleasure to be involved in providing this service to our Nation's most important producers, and I will be happy to answer questions at the end.

Senator GORTON. Before we go on, would you describe how many employees there are in the Yakima station, and what do you do in addition to these specialized agricultural forecasts?

Mr. GRAVES. Our basic staff involves six people; this is true for any 24-hour-a-day operation. We also have one other technician maintaining equipment. The basic Weather Service office, I guess you would call it a small weather office, has the function to take observations important not only to agriculture but to aviation and whatnot. They are used for any number of purposes. This requires six people.

The agricultural program is an add-on duty. We have never had at Yakima, since this program was reinstituted back in 1945, any additional personnel to run it. We run it ourselves. What this involves is that during this time of year, from about mid-February, when we start part of the program, thermometer testing, until the end of the fruit frost forecasting season, usually the latter part of May, we don't permit any annual leave during that time. We have to keep everybody on station so we can provide the service.

Now, for the other agricultural forecasting services we provide year-round. We get calls—even during the frost season, at the end of it, from hay growers. "What's the outlook for precipitation?" "Can I cut my hay now?" And some of the questions I mentioned in the testimony. We deal with all kinds of growers. Primarily, it's the fruit industry in the Yakima Valley. As I said, this service is provided for those who can really do something about the weather, and the fruit industry is one of those.

The fruit industry, in addition to fruit frost, are interested in spray-wind conditions, temperatures to apply various chemicals, timing of application of the chemicals and so forth. Mr. Enbom and Mr. Martin may deal with some exciting new things in that area.

In addition to agriculture, we're also answering public service requests. Last year—or the first year we had a counter—we, just in Yakima, the local exchange—had over about 135,000 calls in 1 year. And other general Weather Service office duties, I would just waste time here describing all of what we do.

Senator GORTON. At any given time of the day, then, you have at least one—but rarely more than two—people on duty?

Mr. GRAVES. Yes, sir. We have one man on duty 24 hours a day. During the week, usually, it's myself that's on duty during the day, in addition to that. I'm also administrator, too. And that's a big function.

Senator GORTON. Thank you.

Mr. Enbom, I believe you have someone with you.

Would you like to introduce him?

Mr. ENBOM. Yes; Jerry Martin from Wenatchee will be speaking for Wenatchee and the clearinghouse in the Wenatchee area.

Senator GORTON. Please continue.

Mr. ENBOM. My name is Gaylord L. Enbom. My wife and I have an orchard in the Yakima Valley and I am also assistant general manager of George F. Joseph Orchard Siding, Inc., a fruit packing and shipping plant located in Yakima.

I am here today representing the Washington State Horticultural Association and am speaking in favor of maintaining the Weather Service as it presently exists as a public responsibility.

We feel that the present system is a very appropriate governmental function. The Weather Service in the Yakima Valley serves not just the large corporate farm, but serves the backyard gardener as well as the 5-acre grower on an equal basis.

Over the years, through full cooperation between the growers in Washington State, Washington State University research, and the National Weather Service, an excellent frost protection program has been worked out. WSU has researched and provided excellent data on flower bud resistance to frost. The National Weather Service has set up key stations throughout the fruit growing areas and prepares and disseminates frost forecasts based on these stations, as well as providing hourly temperature, dewpoint, and inversion information throughout the frost seasons. The procedure is working very well.

Throughout the year the Weather Service provides us with 5-day forecasts and longer range forecasts which help us make proper decisions concerning irrigation scheduling and pesticide spray applications. Too little or too much moisture can cause stress on our trees and ultimately damage our crop size. Many of the pesticides that we use require an 80 degree temperature or better for them to be effective. We use other pesticides that can cause a burn to tree foliage and even to our fruit if the temperature gets too high.

The trend in research is moving toward using prediction models for proper timing of insecticides. These models are based on accurate daily temperature information. Washington State University researcher, Dr. Jay Brunner, has been working on a codling moth model. And Dr. Robert Fye of the USDA's Yakima lab is presently working on a model for pear psylla. The frost stations in the Yakima Valley and Wenatchee Valley can be used to give growers temperature data for their area to help them utilize these models when the research is complete. These stations can also be used to tabulate precipitation and temperature data concerning fire blight and apple scale infections. The environment is the winner whenever better methods on pesticide timing are developed.

Several years ago we were able to purchase weather radio equipment for the Yakima Weather Service station. This opportunity was jumped at by the growers, and it is the primary station used to get the all-important weather information. Over 90 percent of the growers have weather radio receivers. The Yakima County Emergency Services Agency also uses the weather radio to broadcast flood control information and any other weather-related emergency information.

The 1982 fruit crops were worth $636,787,000. The 1983 crop is projected to be worth $700 million. These crops mean tax revenues, jobs, and foreign trade. Weather information is vital in crop production decisions for these jobs and tax revenues.

The economy of this region is very dependent on agriculture. Weather is an intimate part of the economic life of everyone in eastern Washington. The Weather Service simply is not a service provided to only a segment of society, but is important to everyone—the growers, the employees, and the consumers. We believe the Weather Service is an appropriate governmental function.

[The statement follows:]

STATEMENT BY GAYLORD L. ENBOM, REPRESENTING THE WASHINGTON STATE HORTICULTURAL ASSOCIATION

The National Weather Service is extremely important to the growers in the State of Washington as well as the citizens. Marketing and production of agricultural crops is essential to the economy of the state. The ability to accomplish this task depends on accurate and dependable weather information.

According to Washington State extension horticultural specialist Dr. Ronald Tukey, "What makes Washington State and in particular central Washington so vulnerable is the concentration of fruit and their magnitude of the industry concentrated in a relatively narrow band extending from the Canadian border to Oregon are 7,600 fruit growers employing some 25,000 farm workers on 225,000 acres of orchard."

Dr. Tukey also states, "fluctuation in the crop volume has an even greater impact on the off-farm sector of the industry and local communities. These are centers of supply. They also are centers of storage, processing, fresh packing, and transportation. Employed are an estimated 40,000 people whose jobs and businesses depend on the volume of fruit produced."

This past season it also seems that fruit exports were the only commodities that held up their end of export marketing. In order to insure good quality fruit into these markets we have to maintain constant crop production. The focal point in this task is accurate weather data.

FROST PROTECTION

Spring is a very nervous time for most of the tree fruit growers in the State of Washington. Spring means there is a potential for cold night-time temperatures that could destroy our crops if we failed to properly protect our fruit buds.

We have several tools available to us to help us protect our buds. We have gone through a transition from open pot heaters using oil to the use of wind machines, propane heating systems, undertree sprinklers and overhead sprinklers.

We are also fortunate to have excellent research that has been done by Washington State University. Research has further developed critical temperature charts for the different varieties of fruit. The critical temperature is the temperature below which bud damage will occur after thirty minutes. These charts cover the different stages of bud development. Dr. Ed Proebsting, WSU research, prosser, has developed bud hardiness testing procedures which double checks the critical temperature throughout the frost season. This information is broadcast on the weather radio.

One of the important tools that the grower has had available to him is the frost forecasts and hourly updates supplied by the Weather Service. To put it in the words of Dr. Ed Proebsting, "the National Weather Service of Yakima office is the focal point for the whole operation. It is the glue that holds the whole thing together."

Every evening the Weather Service forecasts predicted low temperatures for the valley. They have a formula that they use, and there are twenty-five stations located throughout the valley. The grower uses the predicted low temperature from the station closest to his orchard to determine his expected low. The report includes predicted low, present temperature at the airport key station, and dew point, plus a description of weather patterns expected for the next evening.

The Weather Service gives an up-date on temperature, dew point and fifty foot pole readings hourly throughout the night. This up-date information is critical on potentially cold nights because it tells us how rapidly the temperature will drop and the inversion that the growers will have that night.

PREDICTION AND PRODUCTION MODELS

The trend in research is moving toward using prediction models for proper timing of insecticides and production models. These models are based on accurate short term and long term weather, primarily temperature information. Many of these new models are computer based and can aid growers in making proper management decisions.

According to Dr. Jay Brunner, WSU tree fruit research center, Wenatchee, "The successful implementation of models as tools MOR managing our agricultural systems depends on the availability of accurate, real-time weather information along with a system of forecasting changes."

"The ability of agriculture in Washington state to predict the need for irrigation, pesticide applications, outcome of predator-prey interaction or optimum harvest dates requires the availability of weather information."

Dr. Brunner has been actively doing research developing a codling moth model for the State of Washington. The model is based upon daily temperature information. Through his research Dr. Brunner has been able to delay control sprays for codling moth as much as 21 days saving in some instances, a complete spray application. In other cases pesticide rates have been reduced which results in a reduction of residues.

Dr. Brunner reports that in the not too distant future models should be available for pear psylla, oriental fruit moth, peach twig borer, spider mite/predatory mite interactions and pandimis leafroller. According to Dr. Brunner, "The increased efficient use of pesticides is a savings to both the grower and community as a whole by reducing pesticide loads in the environment. Without the availability of accurate weather information and forecasts the implementation of crop-pest models described above would be difficult if possible at all."

Dr. R. E. Fye, USDA Yakima laboratory, worked on verification of production models on cotton before coming to the Yakima research station. He has started work on a model for pear psylla. His work is too much in the infancy stage to report on, but it is important to note that it is temperature related.

The work that he has done on production models with a team of researchers and computer experts is impressive. According to Dr. Fye, "Through improved management the grower will reduce his costs, and the reduction will be passed on to the American consumer or will make the U.S. grower more competitive in the export market. . . . Therefore, if these models are to be of the greatest predictive value to the grower. It will be essential that the most precise short and long term weather predictions be placed at his disposal.

This past season apple scab has become a problem in the Yakima Valley. The spread of scab infections is moisture and temperature related. A chart (Mills chart) has been developed that can predict whether or not you need to spray after a rain.

The chart is based on length of rain (amount of hours) and temperature. Since rainfall is not uniform throughout the Yakima Valley the need for additional use of the weather reporting stations mentioned in the frost control section is emphasized. The use of these stations will also aid the growers in determining temperature for production and insect models.

We have also learned through research information that through accurate temperature data we can predict whether we have a potential pre-ripening problem developing in Bartlett pears. If we find the conditions are right for premature ripening through the known information a growth regulator can be applied to offset this condition or harvest timing can be properly adjusted.

Presently there is also work being done to predict the control of storage scald based on temperatures recorded prior to harvest. This model when developed can tell the warehouses and growers the potential for storage scald and whether or not it will be difficult or easy to control for that particular season.

For more information concerning this section see letters from Dr. Jay Brunner and Dr. R. E. Fye and Washington State extension bulletin 1072.

WEATHER RADIO

Several years ago we were told by Bob Cardinal, then head of the Yakima office of the National Weather Service, that if we could raise the money ($12,000) to purchase a weather radio the Weather Service would install, maintain, and operate the weather radio. The funds were raised, and the radio was put into operation.

Since that time the growers have utilized the radio station to receive the latest weather data. Over 90 percent of the growers have weather radio receivers. We receive our frost forecasts, weather up-dates, information on fire blight and apple scab infection periods, and other weather related information through the weather radio.

The Yakima County Emergency Services Agency also uses the weather radio to broadcast flood control information and any other weather related emergency information. During the Mount St. Helens eruptions the weather radio was the first to broadcast eruption information.

The weather radio is extremely important to us in agriculture, and we feel it is an absolute must. Commercial radio, television, and the newspaper cannot give us the fast up-dated information the way the weather radio does.

Throughout the year the weather service provides us with five day forecasts and longer range forecasts which help us make proper decisions concerning irrigation scheduling and pesticide spray applications. The temperature and humidity during application of pesticides is extremely important. If we have too slow drying conditions we could get spray damage. If the temperature has the potential of being extremely warm some spray material can cause a burn on the fruit.

Some of the pesticides we use require 80° temperature in order for them to be effective.

Irrigation scheduling is very important. Improper applications of water can cause stress to the trees adversely affecting fruit size. Evaporative pan readings, rainfall information, and temperature all aid us in proper irrigations.

The 1982 fruit crops were worth $636,787,000. The 1983 crop is projected to be worth $700,000,000 . . . this sounds like a great deal of money, but it is not. This past season for most growers in tree fruits was one of the worst years they have had as far as actual grower returns are concerned. This next season does not look to be much better in actual dollars back to the grower. In order to survive the growers need all the information they can get. The bucket does have a bottom in it, and many growers are at the bottom of that bucket. They cannot afford to pay for any more programs than they already are. That is what taxes are for.

The economy of this region is very dependent on agriculture. We must be able to maintain consistency in production. We just have good, accurate weather information to accomplish this production task. Eastern Washington State is dependent on us to do so. The Weather Service is not a service provided to only a segment of society but is important to everyone—the grower, the employee, and the consumer. The weather service needs to be expanded to provide even more weather information. We believe the Weather Service is an appropriate governmental function.

1982 PRODUCTION

	Tons	Value
Apples:		
Packed		$500,000,000
Processors	1,350,000	20,000,000
Pears:		
Bartlett	138,263	21,260,000
Anjou and Bosc	125,700	40,000,000
Peaches	12,500	5,573,000
Apricots	27,000	6,800,000
Prunes and plums	11,500	3,454,000
Cherries	66,000	39,500,000
Total		636,787,000

Estimated crop value this year: $700,000,000.

Sources of information: Yakima Valley Growers Shippers Association, Washington Orgeon Canning Pear Association, U.S. Fruit & Vegetable Marketing Service.

Senator GORTON. Mr. Martin.

Mr. MARTIN. Thank you, sir. My name is Jerry Martin and I'm here representing the Washington Growers' Clearinghouse. That's a fruit growers' association representing 2,700 growers in Chelan, Douglas, and Okanogan Counties and the Columbia Basin. And we are all end-users of the Weather Service.

We have been concerned with recent attempts to cut back on funding for agricultural frost and weather forecasting in the Nation. These funds have, of course, been reinstated, but it appears there will be continued attempts to remove the funding because of budget constraints. Reduced funding would, in effect, close the Wenatchee weather forecasting station.

We, who are the producers of the world's finest apples, are in partnership with Mother Nature. We all know the phrase, "You can't change the weather." But we, as orchardists, do change our horticultural practices to adjust for current and forecast weather conditions.

Centralized weather forecasting out of Seattle or Spokane will not work for our district and our many weather variables in the central part of the State. Mountain ranges to the east, north and west measurably alter our local weather variables. Such things as temperature, precipitation, wind velocity and direction vary from valley to valley.

Our ever-increasing sophistication in areas such as chemical thinning, application of insecticides, fungicides and nutritional sprays, planting, pruning, fruit maturity and harvesting are all guided by accurate local weather forecasting the year-round.

We, as individual growers, do not have the expertise or the necessary equipment to measure such things as dewpoint, which is an important part of measuring temperature for frost control.

I cannot overemphasize the role of the local weather forecaster and his importance to us. Local, timely, and year-round forecasting is important to our area and, thusly, to the economy of the State.

Thank you, sir.

Senator GORTON. Thank you very much.

Mr. Aronovitch.

Mr. ARONOVITCH. Mr. Chairman, my name is Barry Aronovitch. I'm the meteorologist in charge of the Olympia fire weather office. It will be my pleasure to describe the National Weather Service fire weather program in the State of Washington.

The objective of this program is to provide tailored forecasts, warnings, advisories, and consulting services to natural resource agencies in support of wildfire control and wildland management operations.

In the State of Washington, our fire weather offices are located in Olympia and Wenatchee, with a total staff commitment of four National Weather Service forecasters and one State forecaster, with additional support provided by the Seattle forecast office. The Fire Weather Forecasters provide specialized weather forecasts, advisories, and warning services to the field offices and operations sites of wildland management agencies such as U.S. Forest Service, National Parks Service, Bureau of Land Management, Bureau of Indian Affairs, Washington State Department of Natural Resources, and through these agencies to private industry. These agencies reciprocate in many ways. As an example, they cooperatively provide personnel, weather instrumentation, and a communications system which produce the approximately 100 weather observations per day needed by our fire weather meteorologists to produce their forecasts.

A majority of our services are in support of wildfire control and suppression activities. Twice-daily forecasts are provided as input to national fire danger rating computations. Results of these computations determine the best strategy for placement of men and equipment during periods of high fire danger. Localized forecasts are also issued as required to support control operations during a major fire.

Upon request from wildfire control offices, camper-type mobile units, actually a weather forecast office on wheels, manned by a fire weather meteorologist is dispatched to the fire site. Contact between this mobile unit and its home base is maintained by two-way radio and radio facsimile. Because of the hazardous nature of controlling wildfire, where loss of life is always a possibility, and where most losses of life have been weather related, it is necessary that fire weather forecasts be as accurate and as detailed as possible. Hence, the requirement for onsite forecasts and advice.

Being at the scene affords our meteorologist firsthand information regarding local terrain and its effects upon weather. It also lets the forecaster manage a local observation network—a valuable tool. The meteorologist obtains a better grasp of specific problems and needs of fire control management and is available for conference with fire bosses, 24 hours a day. Such mobile unit service is provided to fire control agencies on a reimbursable basis. The increased efficiency of firefighting efforts and the reduced time to gain control of a fire have been noted as many times more valuable than the cost of putting a forecaster on the scene.

Some specifics: The National Weather Service fire weather program in the State of Washington is in support of protection of 26.1 million acres of forest lands, an estimated value of nearly $139 billion at 1982 prices. Because of the diverse geography and topography, these 26 million acres have been divided into 17 fire weather zones for which the 5 fire weather forecasters produce approximately 25,000 forecasts of temperature, relative humidity, wind speed and direction, lightning occurrence, cloud cover, et cetera, per year.

National Weather Service fire weather offices also provide twice-daily site-specific forecasts and advisories for prescribed burning and for the smoke management program of Washington State Department of Natural Resources. Prescribed burning is the controlled burning of wildlands under prescribed conditions of fuel and weather to meet various wildland management objectives, such as hazard reduction and silvicultural improvements. The smoke management program is concerned with the burning of forest harvest residue, called slash, without significantly degrading air quality and, more recently, the visibility of designated class I areas and/or integral vistas. The program objective is to comply with the Clean Air Act of 1977.

Administration of the Federal Clean Air Act requires specific smoke management forecasts which are issued from the Olympia Fire Weather Office. In 1982, 1,191 slash burns, which are regulated by the Clean Air Act, eliminated nearly 2.4 million tons of forest slash from 112,000 acres—without significantly impacting air quality. Reviews of between 2,000 and 3,000 burn proposals are necessary each year to accomplish this. Approval or disapproval of the burns is based upon the smoke management forecast issued by the fire weather office.

In addition, the fire weather office provides forecasts for a host of other wildland management activities, such as insect and disease control, preservation of watersheds, planting and cultivating new growth, promotion of wildland habitat and recreational facilities, forest road construction and maintenance and, most recently, mountain goat transplantation as deemed necessary by the National Park Service.

National Weather Service fire weather meteorologists also work in forestry and land management agencies' training programs, providing instruction in weather and in the use of weather and National Weather Service products in fire management operations.

This is just a sketch of this program in the State of Washington. I will be pleased to answer any questions.

Senator GORTON. Thank you.

Mr. Bledsoe.

Mr. BLEDSOE. Thank you, Senator. I am going to digress on the printed copy you have here and make the strongest case I can for the maintenance of the fire weather service.

I speak for the Washington Forest Protection Association, who hold better than 5 million acres of private forest lands, who are directly impacted by the program that Mr. Aronovitch has very capably laid out in front of you.

Our track record used to be very bad, with a couple of hundred thousand acres a year burnt up. We are down to around 5,000 or 6,000 acres a year, a very decent figure, which is the result of many things—not the least of which is finally getting a fix on the weather. Certainly we are better firefighters, but more importantly, we are better advance planners because we now have the capability to understand something that is outside the technical background of the working forest manager, and that is weather—particularly fire weather.

The program provides two things that directly impact the forest industry, particularly the private sector. It tells us, on a short-term basis, when we should or shouldn't be in the woods, when the conditions are hazardous. It tells this to us in an accurate and understandable and, more importantly, reliable fashion, so we can start to accommodate that into our plans.

It also tells us something else. We have an ongoing forest fire hazard as a result of the nature of the work, where we leave on the forest floor residual slash from forest operations. Sitting there, it constitutes a tremendous fire hazard; removed, it can be contained, the hazard can be reduced, we can live with it. This means we have controlled burns. Now, these can be extremely hazardous if they are lit off in the wrong kinds of conditions, with the potential of adverse winds.

But not only are they hazardous to us in the woods and to our assets and everything else, but they also have the capability of dumping a lot of precipitate and smoke and everything else on metropolitan centers. By working very closely with our unseen partner here—this is the first time; I've dealt with this guy for years and never seen him. But I've dealt with his work, and it's first class, let me tell you.

Mr. ARONOVITCH. Thank you.

Mr. BLEDSOE. He can tell us that we can expect to have winds which will take the particulate matter offshore, where it's not going to constitute a nuisance or a hazard in a metropolitan area with poor air drainage, such as right here in metropolitan Seattle.

At any rate, we think it's a good mix.

Now, the argument that I sense behind the inquiry, "Should we privatize these things?" is: Does it make sense? And, more importantly, should the private sector pick up the tab for these?

Let me anticipate a question, Senator. In a large sense, the general public or the private sector is already picking up the tab for quite a lot of the services because, you see, as one of the services to the public over which the U.S. Congress has supervision, with about 14 million acres of publicly held timberlands in the State: Forest Service lands, BIA, BLM, National Park Service. So you could see that the general public is already being well served by this, through the service to those lands.

Let's assume for the moment that—God forbid—they should go the full limit and privatize these things and that they were fully user paid. In which case, if it were user paid, it could be proprietary information, in which case we'd send you people the bill for the information that the Forest Service and BLM might have to have to perform their functions. So that—while I realize it's sort of a ludicrous possibility—nevertheless, that possibility could exist. It certainly does not have the potential of being a net saving, by privatizing.

Further, there's another function, and that is the capability of the arm's-length relationship between him and us. Because in many cases they have to say no. No, you cannot go in the woods. No, you cannot burn today or this week. The proprietary operation—sometimes the ability of the man at arm's length to say to his client, "No, you can't do it," is hampered simply by the binding nature of the operation.

There is one other factor that we feel is absolutely essential in this area, and that is lead time, which knowledge of this weather, short-term/long-term, can provide for us—particularly when it's interpreted in terms of fire capability. It's not a standard weather broadcast or forecast; it's a very rifleshot forecast but it's absolutely essential. So we now know ahead of time when the hot, dry eastern winds are going to be descending on us with their lightning strikes. So that says to us that we can start doing some things internally to accommodate this. We know, for instance, that we're going to be looking at, first, exposure, but second, potential shutdowns. So we can start to schedule, adjust mill inventories, shuffle work schedules, logging shutdowns, and these kinds of things, to have minimal impact on the bottom line—which is economics and the jobs that are related.

And, of course, the slash burns, which we've already dealt with. But when the meter starts to run on a slash burn, where you've got a large crew sitting there at $10 to $20 an hour, where you've got a chopper sitting there at $250 to $350 an hour, you want to know that you can go. You certainly can't afford to sit there and twiddle your thumbs on a potential or proposed slash burn. Working closely with these people we have a fix on this thing and a time line which is incredibly accurate.

Billions of dollars in jobs, and everything else—we're still talking economics, but there's one downside thing that has to be considered, and that is lives. Fire in the woods kills. Now, fortunately, our track record has been quite good in the recent past. But we certainly can't forget the Idaho fire with 85 people burned to death, the great Idaho fire; and certainly down in the Yacolt burn, 38 deaths there. We certainly don't want to repeat that. So in the area not only of fire control, but the procession of witnesses have also described the life-threatening capability for airmen and mariners and other people knowing accurate weather or, worse, the tragedy of not having an accurate handle on the weather.

So, at any rate, I think that the case is compelling for permanent continuation, particularly of this fire weather situation, because it has, first, an economic impact, but it also has an impact on lives. It's cheap, it's cost effective, it's efficient, and it works. And, "If it ain't broke, don't fix it."

[The statement follows:]

STATEMENT OF STEWART BLEDSOE, EXECUTIVE DIRECTOR, WASHINGTON FOREST PROTECTION ASSOCIATION

Chairman Gorton, committee members, ladies and gentlemen, good day. I am Stewart Bledsoe, executive director of Washington Forest Protection Association. WFPA represents 5 million acres of private industrial and non-industrial Washington state timberlands. We are an association of diverse interests but fire control has been a top association priority since its 1908 inception.

Fire control covers many landowners, agencies and topics. They all fit into the puzzle to complete an effective program. Where wildfire used to burn hundreds of thousands of acres, yearly, we now burn less than 5,000. Where slash was left to burn in an uncontrolled manner, we now burn it with control of the fire and smoke.

A critical piece of the above puzzle is the National Weather Service Fire Weather Program. We have worked diligently to save the program and we hope you, the committee, can be convinced it is a worthy effort.

The fire weather program provides Washington state citizens two forestry oriented services: Washington state's weather is notoriously capricious. Short-term fire weather forecasting has dramatically improved our ability to predict local weather conditions; telling us when we should and should not be in the woods; telling us when we should be prepared to expect lighting and dry east winds; telling us when we can and, more importantly, cannot safely burn slash. Secondly, when we do burn slash, the fire weather service is increasingly accurate in telling us where the smoke will go. We are proud of our increasingly good record.

The argument could be made the fire weather program should be user funded. In a large sense it already is. The U.S. Forest Service, BLM, BLA, and National Park Service all depend on the program for accurate weather across the state. In addition, the system directly protects the citizenry using our forests, both private and public.

How?

The programs' most important positive factor aside from accuracy is lead time. We now know ahead of time when the hot, dry, east winds and lightning are going to strike. Lead time is important for resource protection but it also gives our industry time to adjust mill inventories, shuffle work schedules and logging shut downs. Slash burns are critically dependent on lead time. Without adequate lead time, our crews and helicopters sit while waiting for weather reports. Our workers receive $10 an hour and more and helicopters cost $250-$300/hr. Even a one hour wait can be expensive.

I could cite you endless statistics on billions of board feet, billions of dollars, thousands of jobs that depend on adequate fire protection but I think you have that picture. Here's another picture you should consider:

Great Idaho Fire: 85 people burned to death

Yacolt Fire: 38 deaths

That, gentlemen, is a bottom line worth looking at with the other facts you will receive today. We are talking not only resource protection and wildlife protection but we are talking human lives. Fire kills. It kills fish, wildlife and people. All the other program benefits become pale, indeed, when compared to the lives saved.

When you add the monetary and resource protection offered by the fire weather program you have a compelling case for its permanent continuation. When you add the human and animal lives the need is irrefutable.

It amazes me that I stand before you fighting for the life of this program. It's cheap, cost effective and tightly run. It serves well our industry and its employees. It serves well all the state's citizens. I've said this before and it is again appropriate, "If it ain't broke, don't fix it."

I rest my case.

Senator GORTON. Mr. Bledsoe, are there other services which could be provided without the National Weather Service, either by your own members or by the private sector?

Mr. BLEDSOE. Interestingly enough, some of those are already in place. We're answering some questions that we feel are important to us on a microclimate basis, where we couldn't expect an umbrella organization such as theirs to give us the answer to the winds in a certain sector of Grays Harbor County. So some of our members are jointly purchasing a weather balloon to give us exact readings at 300 to 400 feet intervals, if we need that kind of information.

Senator GORTON. But, in effect, that would provide information for yourselves?

Mr. BLEDSOE. That is correct. And I don't think it's legitimate for us to expect to have it provided. We are also participating in the support of the fire weather service by an assessment on our lands now. We participate through—participation through the Department of Natural Resources at the State level.

Interestingly enough, our contribution to that fund has increased from about 29 percent in the 1979–81 biennium up to a 44-percent increment in the biennium to come. During that period the Federal Government contribution has remained almost static. So you can see that we are now participating in this kind of support.

Senator Gorton. Thank you.

Mr. Aronovitch, I probably should have saved this question for you rather than for the first panel, and I expect you have heard it: Is the ability of the polar orbiting satellites to detect temperature variations utilized in the forest weather predictions, to be precise?

Mr. Aronovitch. I think, Senator, it would be a valuable asset to us, but it's simply not available to us. The only satellite data that we have is a very, very washed-out picture that comes across to us on the national facsimile circuit. So I really couldn't say to what extent, other than the fact that I wish I had that data available to me. I think it would be helpful.

Senator Gorton. Why is it not available?

Mr. Aronovitch. Lack of funding. We don't have the equipment—the money to buy or purchase the equipment it would take.

Senator Gorton. If it were there and you had the equipment, you could use it?

Mr. Aronovitch. Oh, and how. Yes, indeed.

Senator Gorton. And it would be of value, Mr. Bledsoe?

Mr. Bledsoe. Yes. No doubt about it.

Mr. Aronovitch. And I might add that the balloon sounding that he's referring to—we also obtain that data and that goes in as part of our forecast network, too.

Senator Gorton. I see. Thank you.

Now, for the three of you who spoke to the agricultural use of weather forecasts: The testimony stated a $700 million value in fruit crops in the Yakima Valley.

Mr. Graves. That's State.

Senator Gorton. Can you estimate the damage to the crop of a sudden frost that was not forecast successfully?

Mr. Enbom. You could take a reduction of about 60 percent of that.

Senator Gorton. It could go as high as 60 percent?

Mr. Enbom. Yes.

Senator Gorton. Under what circumstances? What time of year?

Mr. Enbom. Under frost protection it could be anywhere from about the middle of March to the middle of May. It's all the formative time of your fruit and they're very susceptible to cold weather. They're actually susceptible to cold weather all year long, but that is the time of the year when you do get colder nights that can affect your fruit.

Senator Gorton. When you get such a forecast, what do your members—what do people in the fruit community do about it?

Mr. Enbom. Well, in reference to Mr. Graves' testimony, where he states that they give 2 to 3 nights' projection, maybe that particular night that you're listening to is going to be above 32 degrees, nothing to worry about—you may not have run your wind machines, you may not have tested your system for awhile. If you have a potential night coming up that's going to be cold you're going to go out and you're going to start those wind machines, you're going to start up your equipment to make sure that everything will function when the critical time hits. Because, if not, you hit the critical temperature, in as little time as 30 minutes, you can lose your fruit.

Senator **Gorton**. As against a potential 60 percent loss, if you simply had no prediction at all, which obviously would result in a severe unpredicted frost, what would your loss be if you got a good prediction but still you got a very, very severe—say, a 10-year frost. How much of that 60 percent could you save?

Mr. **Enbom**. I don't know; that would be hard to say. It depends on the temperature itself. We can only protect to a certain temperature. And if it goes below that, I don't care what type of system you have, you're in trouble. We have had that happen.

Senator **Gorton**. How much confidence in and dependence on weather forecasts do you all have?

Mr. **Enbom**. We're very dependent upon weather forecasts.

Senator **Gorton**. Are you confident? Are they accurate?

Mr. **Enbom**. Yes. About as accurate as you can get. Our valley is very similar to what Jerry Martin testified, that you have hills and valleys and we can have differences in temperatures of 8 degrees between one area of the valley and another area of the valley. But the information that we receive gives us the potential for our area, what it's going to be. It gives us dewpoint, it gives us inversion temperatures, what the 50-foot pole reading is, so we know what kind of air we have, versus 5-foot readings.

The forecast gives us various information that we utilize throughout the night in determining whether we put supplemental heat in with wind machines, whether we increase water pressure for better coverage, or whatever system we're using. Dewpoint—whether we turn our systems on earlier than the critical temperature—because as the dewpoint drops you have potential frost loss at a lower temperature than you do at the normal 25 degree dewpoint.

Mr. **Martin**. Senator, it's important to understand that both in the Yakima and Wenatchee area we each have a system of cooperation with the local weather stations, wherein we have a number of key weather stations that we operate, as growers, in conjunction with the Weather Service. When they give us their nightly forecast, they're giving us not only service from the Weather Service, but they're getting all of this local knowledge from we, the growers, who are operating all these key weather stations. So they can and do predict with a reasonable degree of accuracy—thank goodness—at a whole spectrum of places, rather than just the Yakima key station and the Wenatchee key station.

And it's of interest to me, at least, also as an advertiser, that it's extremely difficult to get a spot surrounding the evening fruit frost forecast on the local radio station, because everybody wants to advertise there because they know every grower from the border to the border is tuned in on those nightly frost forecasts.

Senator **Gorton**. Mr. Graves, what is the importance of that information that you gather from your constituents?

Mr. **Graves**. They are the ones who provide it, and we need the feedback the next day as to how cold it actually got in an area to verify our forecast, to see if our thinking was correct on that night. In other words, you put out a forecast, and you need to know the next day: Did it verify or did it not? Was my thinking right or was it wrong? I can only know the answers to these questions by getting back this information.

The growers are the ones who man these stations. They get the information to us in a number of ways. They either call it in; sometimes, we have a couple of stations that even mail it in. We're using a paucity of weather data to try to forecast small-scale weather features. That's like trying to catch a bunch of minnows, using a whale net. It's extremely difficult. The growers provide the reports so we can come up with a forecast. By using the big observing network we can predict what happens in a little particular spot. It is—I'm not going to call it a guess—it's a forecast. We're using as much information as we can get.

Senator GORTON. How far is the fruit forecast good for? You have weather stations in Yakima, you have one in Wenatchee. How much use does that provide to fruitgrowers in the Okanogan, for example? Are you going to have substantially different conditions there?

Mr. MARTIN. Yes, sir. You will have different conditions there. The station in Wenatchee is actually the prime station for the Okanogan and they are getting feedback from the Okanogan area. This man—he lives with the problem, or these people in the Wenatchee station do. We feel, fortunately, in Wenatchee that the local weather station is colocated with the USDA experimental facilities in Wenatchee and with the WSU facility. So these people, having the opportunity to have coffee together every morning, literally, know exactly the interrelationships between not only the fruit frost forecasts, but all the other problems that we, as growers, have that are weather-related problems: the application of pesticides or other sprays, et cetera, and I could go on and on. But it is a working partnership-relationship, in Wenatchee; and it's working and we would hate to see that go away.

Senator GORTON. I want to thank all the members of this panel for their testimony. Thank you very much.

Our final panel will be Mr. Hutcheon and Mr. Trudell.

STATEMENTS OF DICK HUTCHEON, AREA MANAGER, NWS, SEATTLE; AND BERNARD TRUDELL, SARSAT, MISSION MANAGER, NASA

Senator GORTON. Mr. Hutcheon, we'll start with you.

Mr. HUTCHEON. My name is Richard Hutcheon, and I am area manager for the National Weather Service [NWS] for the State of Washington. As area manager, I am responsible for all weather services, forecasts, and warnings provided in the State.

Mr. Chairman, it is a pleasure for me to appear before this committee to testify on our services provided in connection with the Mount St. Helens warning dissemination program and data collection system.

This new volcano has presented a dramatic challenge to us in our mission to protect lives and property. First, during periods of potential eruptions and during actual eruptions, we provide trajectory forecasts of the ash plume and observations by NWS radar of the actual ash plume. Second, the very real threat of floods and flash floods has involved us in two major efforts: Providing warning services and establishing the data collection system needed to support them.

There are three possible threats of flooding associated with Mount St. Helens. Immediately after the May 18, 1980, eruption, the change in the character of the rivers in the mountain's vicinity was recognized. Silt and debris from the eruption had partially filled in the Toutle and Cowlitz Rivers, subjecting these rivers to a high possibility of flooding. This threat continues today. A second possibility of flooding along these rivers is another eruption and subsequent snowmelt and mudflow. The last flash flood of this nature occurred March 19, 1982. This threat still exists whenever there is a snowpack on the mountain. The third threat of flooding comes from the breach of one of the three debris dams restraining lakes in the area. The best known of these, of course, is Spirit Lake, which was declared to be a state of emergency by President Reagan in August 1982.

We have worked closely with other agencies of the Federal Government to develop dam break models to determine the impact a breach of the debris dams holding back lakes in the vicinity of Mount St. Helens would have on downstream communities. In addition, we have developed a state-of-the-science system to warn of flooding.

The remoteness of the mountain area, the danger of placing personnel in that area, and the potential speed with which a flash flood can develop have prevented us from responding to these threats in a usual manner. The NWS installed an event-reporting river and rainfall monitoring system to provide the data we need to detect danger and issue warnings. This system initially consisted of 16 rain gages and 16 river and lake level gages.

Briefly, the NWS event reporting system operates as follows: Each gage has radio telemetry associated with it. On the rain gage, for example, every time 1 millimeter of rain falls into the gage, a radio signal is sent to a receiver at Kelso, then by land lines to the NWS at Seattle and Portland. Computers at these locations record the rainfall from each site, allowing forecasters to know immediately how much rain has fallen. Likewise, with the river and lake level gages, a change in elevation of the water level by a predetermined amount triggers a radio signal, thus allowing the forecasters to know instantly of any significant changes. The U.S. Geological Survey [USGS] has also installed a number of river and lake level gages in this area. The NWS has access to information from all of these gages. This cooperative arrangement has resulted in an automated system which is protected by adequate redundancy.

The NWS in Seattle has three means of receiving data from this network of gages. The first method is the NWS event system which reports directly through receiving radios and into a data computer at the Seattle Forecast Office. Information is received through this system in real time. If certain preset criteria are exceeded, such as the Spirit Lake level dropping at a rate of more than two-tenths feet in 3 hours, an alarm will be sounded in the forecast office alerting the duty forecaster.

A second method of receiving information from the mountain involves the USGS gages. These gages send a signal to a Geostationary Operational Environmental Satellite [GOES] and down to the USGS facility at Tacoma. A dedicated land line then brings these data to the Seattle Forecast Office computer. Normally, data is sent at 20-minute intervals. However, if critical levels are exceeded, emergency transmissions are made at 1-minute intervals. This system can also cause an alarm in any office, and further alerts USGS personnel through a dialup pager system.

The third method of receiving data is also through the GOES satellite but down to a ground receiving station at Wallops Island, Va., and into the NWS's communication network. These data are received at WSFO, Seattle, on our nationwide AFOS [automation of field operation and service] computer system. They also alarm if certain criteria are exceeded. This system has a built-in 20- to 50-minute delay because of time involved in transferring through the various computer systems.

These three data systems are supplemented by real-time consultation with the USGS employees and with visual observations from Corps of Engineers' [COE] contractors on Spirit Lake, and Cowlitz County employees at Elk Rock. The entire system is monitored 24 hours a day at our Seattle office, backed up by the Portland Forecast Office, which also has access to the data.

When flood warnings are issued, we utilize the warning dissemination systems established by the NWS, Federal Emergency Management Agency [FEMA], the State of Washington, the concerned counties, and the U.S. Forest Service [USFS]. Included in this system is the NOAA Weather Radio [NWR], especially funded by the Congress and installed at Boisfort Mountain to serve the communities in the vicinity of Mount St. Helens with 24-hour-a-day forecasts and warnings.

Sir, in summary, this system uses state-of-the-art technology with built-in redundancy and human interaction and interpretation. We built it to provide us with the information required to issue warnings for flooding caused by rainfall, eruptions, or debris dam breach in a timely and reliable manner.

I will be pleased to answer any questions.

Senator GORTON. And Mr. Trudell.

Mr. TRUDELL. Mr. Chairman and members of the committee, I am pleased to be here today to present testimony concerning the operation and benefits of the satellite-aided search and rescue program, Cospas/Sarsat, an international, cooperative effort using weather satellites operated by the National Oceanic and Atmospheric Administration [NOAA], and the Cospas satellites of the Soviet Union. As NASA's Sarsat Mission Manager, I represent the agency, which has the lead responsiblity for the demonstration phase of the Cospas/Sarsat program. I will describe briefly the system operation, teaming arrangements, actual experience to date, and future plans.

When a plane crashes, or a ship is endangered, the greatest challenge facing search and rescue crews is locating the scene of the emergency as quickly as possible. Studies have shown that if survivors of an air crash are rescued within 8 hours their survival rate is over 50 percent. If the rescue is delayed beyond 2 days, their chance of survival is less than 10 percent. One of the most exciting new applications of NOAA's polar orbiting weather satellites is their use to detect and locate aircraft and vessels in distress. The low polar orbit, which is so well suited to gathering weather data on a global scale, is also ideally suited to this new search and rescue application.

When an accident, such as the capsize of a sailboat or the crash of an airplane occurs, an emergency radio transmitter is set off automatically. The signals are received by the satellite, using relatively simple instruments, and are relayed to a ground station. This information from the satellite is used to determine the location of the accident. The rapid motion of the satellite over the scene of the accident causes a change in the transmitter frequency, which appears to increase as the satellite approaches and decrease as it moves away. Computer analysis of this phenomenon—the Doppler effect—yields an estimate of the location of the transmitter, usually to within 20 km, and frequently much better. At this distance, the direction-finding receivers on search and rescue aircraft and boats can accurately and rapidly "home" on the crash scene. A single satellite equipped with search and rescue instruments can cover the entire Earth every 12 hours. A constellation of four such satellites cuts this time to a maximum of 3 hours.

Within the United States the satellite-aided search and rescue work is a cooperative effort among NASA, the U.S. Coast Guard and the Federal Aviation Administration of the Department of Transportation, the U.S. Air Force and, of course, NOAA. NASA is responsible for overall program management of the search and rescue mission including the development and systems engineering of the combined space/ground system. The U.S. Coast Guard and the U.S. Air Force, in their role as search and rescue operational agencies, are responsible for operating the ground stations and evaluating the performance of the system in the U.S. maritime and inland search and rescue regions. NOAA agreed to fly the search and rescue instruments on their operational polar-orbiting weather spacecraft.

The global coverage of the polar orbiting satellites, coupled with the universal need to improve search and rescue services, has led to intense international interest and wide participation in the endeavor. The United States, Canada, and France have jointly developed the Sarsat system which is flying on the NOAA satellites. The Cospas system was developed by the Soviet Union. In 1980 the Sarsat partners agreed with the Soviets on a joint demonstration project called Cospas/Sarsat. Interoperability among the two systems was thus established, allowing all participating nations to use both systems to detect and locate emergencies. Since 1980, Norway, Sweden and the United Kingdom have joined the joint project and we are actively corresponding with at least a dozen additional nations which have also expressed an interest in participating.

The first satellite was launched within the framework of the agreement by the Soviet Union in June of 1982. We started working with Cospas early in September. Just 9 days after we turned the satellite on for our use, we had our first rescue up north of here in British Columbia. During March of 1983, both the second Soviet satellite, Cospas II, and our first satellite, Sarsat, were launched aboard the NOAA-E. All three of these satellites are in use now, in orbit, and are providing good data. So we have a very viable demonstration with excellent service.

Basically, the service is working and there are some—as you would imagine, using technology like this—there are some vagaries and sometimes we don't hit every one. We have to investigate the reasons involved. But for the most part, it has provided a very valuable service to the rescue community. I have at the back of this statement, a summary of the saving of 60 lives that have been credited to the satellite system since the start of this demonstration in September. It's a very spectacular program.

The most exciting results produced to date using the Cospas/Sarsat system involve the use of the system to assist in the saving of human lives in actual distress incidents. At this writing, 60 human lives have been saved in 23 separate incidents in Canada, the United States and Western Europe, and the list should continue to grow on a weekly basis. A snyopsis of the circumstances of these rescues is attached. In many of these cases, the only alert was provided by the Cospas/Sarsat system. In the other cases, where knowledge of the missing persons was available to search and rescue authorities, the accurate location data provided by Cospas/Sarsat was crucial to the success of the mission.

Senator GORTON. Do you have some within the State of Washington?

Mr. TRUDELL. Yes. We had two Washington State students who went to take photographs of ski areas and ran into trouble and crashed in a very remote section. This was sometime in the morning—I think on January 31. The satellite came over several hours later and provided a location. Along with that, there was a family concern which was expressed, which caused alerts to be issued. To make a long story short, before the end of the next day the students were picked up. As they were in a very remote area, the signals were too weak to be picked up by the commercial aircraft. It's hard to say, in a case like that, whether we would have launched a search immediately when we had the data, but the satellite was certainly a highly contributing factor and I think the students were quite happy. They didn't care if it was a Russian satellite that provided the data. To them, it was good to be back home. That accident could have resulted in some real problems, because the weather was quite cold and it wes quite a remote area.

Although the demonstration and evaluation phase of the program using all three satellites has just begun, the results achieved to date encourage optimism that the demonstration will be a success and that an operational system will be implemented. Final decisions on the implementation of an operational system, its characteristics and funding, will not be made until the completion of the demonstration and evaluation phase. However, all of the Cospas/Sarsat partners recognized that the system would probably be used in actual distress situations almost immediately after launch. Therefore, continued satellite coverge on an interim basis has been planned. The next five NOAA satellites will be equipped with Sarsat instruments providing two-satellite coverage for the balance of the 1980's.

The Soviets have two additional satellites already built which will provide two-satellite coverage through 1986 and they are planning on sufficient additional satellites to carry them through the late 1980's as well. This 7-year period of interim coverage will insure an orderly transition from the present demonstration system to an effective internationally funded operational system.

Without a doubt, this new application of satellite technology to a universal need of mankind would not have been realized without the early and continuous leadership of the United States. The use of the NOAA weather satellites as the carrier of these new "piggyback" instruments was a crucial factor in our ability to provide this leadership, because of the economies achieved by this approach. All of the Government agencies involved, the administration and Congress, can take great pride in the remarkable successes achieved by Cospas/Sarsat.

[The statement follows:]

Statement of Bernard J. Trudell, SARSAT Mission Manager, Goddard Space Flight Center, NASA

Mr. Chairman and Members of the Committee, I am pleased to be here today to present testimony concerning the operation and benefits of the satellite-aided search and rescue program—COSPAS/SARSAT; an international, cooperative effort using weather satellites operated by the National Oceanic and Atmospheric Administration (NOAA), and the COSPAS satellites of the Soviet Union. As NASA's SARSAT Mission Manager, I represent the Agency which has the lead responsibility for the demonstration phase of the COSPAS/SARSAT program. I will describe briefly the system operation, teaming arrangements, actual experience to date, and future plans.

BACKGROUND

When a plane crashes, or a ship is endangered, the greatest challenge facing search and rescue crews is locating the scene of the emergency as quickly as possible. Studies have shown that if survivors of an air crash are rescued within eight hours their survival rate is over 50 percent. If the rescue is delayed beyond two days, their chance of survivial is less than 10 percent. One of the most exciting new applications of NOAA's polar orbiting weather satellites is their use to detect and locate aircraft and vessels in distress. The low polar orbit which is so well suited to gathering weather data on a global scale, is also ideally suited to this new search and rescue application.

HOW THE SYSTEM WORKS

When an accident such as the capsize of a sailboat, or the crash of an airplane occurs, an emergency radio transmitter is set off automatically. The signals are received by the satellite, using relatively simple instruments, and are relayed to a ground station. This information from the satellite is used to determine the location of the accident. The rapid motion of the satellite over the scene of the accident causes a change in the transmitter frequency which appears to increase as the satellite approaches and decreases as it moves away. Computer analysis of this phenomenon—the Doppler effect—yields an estimate of the location of the transmitter, usually to within 20 km, and frequently much better. At this distance, the direction-finding receivers on search and rescue aircraft and boats can accurately and rapidly "home" on the crash scene. A single satellite equipped with search and rescue instruments can cover the entire earth every twelve hours. A constellation of four such satellites cuts this time to a maximum of three hours.

THE TEAM

With the United States the satellite-aided search and rescue work is a cooperative effort among NASA, the U.S. Coast Guard and the Federal Aviation Administration of the Department of Transportation, the U.S. Air Force, and, of course, NOAA. NASA is responsible for overall program management of the search and rescue mission including the development and systems engineering of the combined space/ground system. The U.S. Coast Guard and the U.S. Air Force, in their role as search and rescue operational agencies, are responsible for operating the ground stations and evaluating the performance of the system in the U.S. maritime and inland search and rescue regions. NOAA agreed to fly the search and rescue instruments on their operational polar orbiting weather spacecraft.

The global coverage of the polar orbiting satellites coupled with the universal need to improve search and rescue services has led to intense international interest and wide participation in the endeavor. The U.S., Canada, and France, have jointly developed the SARSAT system which is flying on the NOAA satellites. The COSPAS system was developed by the Soviet Union. In 1980 the SARSAT partners agreed with the Soviets on a joint demonstration project called COSPAS-SARSAT. Interoperability among the two systems was thus established, allowing all participating nations to use both systems to detect and locate emergencies. Since 1980, Norway, Sweden, and the United Kingdom, have joined the project and we are actively corresponding with at least a dozen additional nations which have also expressed an interest in participating.

CURRENT STATUS

The first satellite within the framework of the joint COSPAS/SARSAT project was launched by the Soviet Union on June 30, 1982. During March of 1983, the second COSPAS satellite and the first SARSAT-equipped satellite, NOAA-E, were successfully launched. All of the satellites are operating quite well, thus, three satellites will be available for the balance of the demonstration phase of the program.

Ground stations and control centers are in regular operation in the U.S., Canada, France, the USSR, Norway, and the United Kingdom. The performance of the combined satellite/ground system has equaled or exceeded expectations in terms of sensitivity, accuracy, and ground coverage afforded by the system.

USE OF THE SYSTEM IN ACTUAL DISTRESSES

The most exciting results produced to date using the COSPAS/SARSAT system, involve the use of the system to assist in the saving of human lives in actual distress incidents. At this writing, sixty human lives have been saved in twenty-three separate incidents in Canada, the U.S., and Western Europe, and the list will continue to grow on a weekly basis. A synopsis of the circumstances of these rescues is attached. In many of the these cases, the only alert was provided by the COSPAS/SARSAT system. In the other cases, where knowledge of the missing persons was available to search and rescue authorities, the accurate location data provided by COSPAS/SARSAT was crucial to the success of the mission.

OUTLOOK FOR THE FUTURE

Although the demonstration and evaluation phase of the program using all three satellites has just begun, the results achieved to date encourage optimism that the demonstration will be a success and that an operational system will be implemented.

Final decisions on the implementation of an operational system, its characteristics and funding, will not be made until the completion of the demonstration and evaluation phase. However, all of the COSPAS/SARSAT partners recognized that the system would probably be used in actual distress situations almost immediately after launch. Therefore, continued satellite coverage on an interim basis has been planned. The next five NOAA satellites will be equipped with SARSAT instruments providing two-satellite coverage for the balance of the 1980's.

The Soviets have two additional satellites already built which will provide two-satellite coverage through 1986 and they are planning on sufficient additional satellites to carry them through the 1980's as well. This seven year period of interim coverage will ensure an orderly transition from the present demonstration system to an effective internationally funded operational system.

CONCLUSIONS

Without a doubt, this new application of satellite technology to a universal need of mankind would not have been realized without the early and continuous leadership of the United States. The use of the NOAA weather satellites as the carrier of these new "piggyback" instruments was a crucial factor in our ability to provide this leadership because of the economies achieved by this approach. All of the government agencies involved, the Administration, and Congress can take great pride in the remarkable successes achieved by COSPAS/SARSAT.

COSPAS/SARSAT RECORD LIST OF EVENTS—AUGUST 17, 1983

[Number of persons rescued to date—60]

Date	Location	Type of ship/plane (name and tail No.)	Number of persons rescued	Details
1982				
Sept. 10	Canada, British Columbia.	Cessna 172	3—John Zeigerheim, pilot; George Heemserk and Garry Vanamerelsvoot, passengers.	Led rescuers to within 22.5 km (13.9 mi).
Sept. 29	Canada 160 mi north of Montreal in heavy terrain.	Private plane	1 survivor	Rescue teams reached scene 2½ hours after COSMOS picked up signal. 1 passenger deceased.
Oct. 10	Atlantic Ocean 300 mi off New England Coast.	Capsized catamaran, seas running 25 feet.	3 sailors	USCG cutter Vigorous and a merchant or tanker, California Gerry, plus merchant vessel Atlantic ACE, served as windbreak for cutter which made 5 passes.
Nov. 7	Bahamas	36-ft sailboat, "Blue Jeans" on way from Tortola to San Salvador Island.	5—Anne Whitney, owner Bradenton & Sarasota, Fl; Walter Coodeway Sarasota; Lorin Hall Sarasota; Nathaniel and Janet Gould, Palmetto. 3 men, 3 women.	Probably would not have been found without COSMOS. Helicopter rescue by CG chopper from Grand Turk.
1983				
Jan. 30	Altantic Ocean, 800 km (497 mi) west of Canary Islands.	6 meter (19 ft) catamaran sailing from Tenerife to Venezuela.	2 men (Spaniards) Fernando Ramos, Alberto Franco.	1st rescue direction by French at Toulouse. They picked up signal from COSMOS on Friday (1/28). Plane from Las Palmas Airport (Canaries) spotted men in dinghy Saturday (1/29) and British merchant ship picked them up on Sunday (1/30) at 2 a.m.
Feb. 1	State of Washington, 10 mi west of Winthrop Airport.	Light aircraft	2 men (students University of Washington).	FAA notified by concerned parents. FAA notified MCC. MCC got signal from COSMOS. Helicopter rescued men on 2/1, 1½ days after crash. Both men "cold, but in good shape."
Feb. 6–7 (save)	Northern British Columbia, Canada.	Ski-equipped Piper Super Cruiser on round-robin flight out of Hudson Hope, British Columbia.	2 persons	Reported overdue by Canadian officials. ELT signals picked up 2 hours later (11:11 p.m. PST, 2/6) Helicopter rescued party next day at 10:40 a.m. PST. Party not injured but suffered frostbite. Plane damaged ski and propeller landing on lake at 8,000 feet elevation. Signals picked up by RCC Victoria, BC, and CG in Kodiak and Point Reyes.
Feb. 12 (assist)	Newfoundland, 58°06'W, 48°18'N.	Jet Ranger helicopter	1 pilot	Oil company reported chopper overdue. COSMOS picked up signals on 2 passes, info picked up by RCC Halifax and translated into location. Company search parties located chopper and pilot 2 hours later.
Mar. 4	Littleton, N.Hamp	Light aircraft	1 pilot	Canadian plane off course. Landed on highway in United States. Ground party rescue. Bad weather.

COSPAS/SARSAT RECORD LIST OF EVENTS—AUGUST 17, 1983—Continued

[Number of persons rescued to date—60]

Date	Location	Type of ship/plane (name and tail No.)	Number of persons rescued	Details
Mar. 7	Sept Isle, Quebec	Cessna 183	2 persons	France, Canada and United States picked up signal from COSPAS. 1st time all three in one emergency.
Mar. 14	75 mi south of Kotzebue, Alaska near Serpentine Hot Springs, 65°51'N, 164°43'W.	Single engine PA-18	2 people—Bernard Schwind, pilot, and his 11-year-old son.	Damaged landing skis and propeller in landing. Rescue by Alaska Army Guard 3d Eskimo Scout Bn, and the Civil Air Patrol. Crash only 10.3 NM from Sarsat location of 66°013'N, 164°45'W. Family dog saved.
Apr. 3	Bay of Gascogne off French coast.	Sailboat	6 persons	Toulouse heard signal after alert from overflying aircraft. Rescue made by Spanish fishing trawler.
Apr. 7	400 mi south of Selawik, Alaska.	Munz Northern Airline twin engine, British built Britten-Norman Islander.	1 survivor—Mary Pat Collins. Ms. Collins, an airline employee, suffered broken bones in feet. Released from hospital April 19.	Musher McManus was returning to his home in Ambler, a 375-mi flight from Nome when plane crashed on a 3,000-ft high mountain. He and his dog team had finished 4th in the all-Alaska Sweepstakes Race, a 408-mi run from Nome to Candle and return. Pilot, Donald E. Kelly, and musher Pete McManus, killed in crash. 8 of 11-member dog sled team perished, 3 survived.
Apr. 12	Montreaux, Switzerland.	Single-engine Cessna 210.	1 survivor (pilot)	On flight from Zurich to Sion, snow storm, crashed in mountains near Montreaux. Airlines picked up weak intermittent signals. Toulouse MIC computed location to within 2.8 km (1.7 statute mi). Survivor flown out by Swiss rescue forces helicopter. One passenger killed.
Apr. 23	Near North Pole in High Arctic.	2 Cessna 185's leased by Mason International Alaska, and chartered by Navy's Office of Naval Research.	5 persons	Pilots became disoriented and landed, ELT picked up by Canadians in Edmonton and relayed to Trenton RCC, which alerted Danish rescue forces in Thule. Danish 3-engine Dakota (C47) flew to site, rescued people. 1 Cessna flew out with Dakota after siphoning fuel from other Cessna 185. No injuries. Remaining Cessna 185 to be repaired and flown out later.
Apr. 25	Austria	Glider, crashed 14 km (8.6 mi.) from last SARSAT point at altitude of 1,750 meters (5.741 ft).	1 person (seriously injured).	Rescued by military helicopter after signal picked up by Toulouse and relayed to RCC in Vienna.
May 31	Canada, District of Mackenzie just north of British Columbia border. Coordinates: 60°12'N, 124°42'W.	Aircraft: type unknown.	1 person name not availble.	Crash occurred at a remote airstrip. Other details not available.

COSPAS/SARSAT RECORD LIST OF EVENTS—AUGUST 17, 1983—Continued

[Number of persons rescued to date—60]

Date	Location	Type of ship/plane (name and tail No.)	Number of persons rescued	Details
June 3	Northern British Columbia, Canada. Coordinates: 58°40′N, 124°42′W.	Twin engine Piper Seneca, red with blue and white stripes. Call sign or identification, CG-GIB.	1 person pilot, M. Kostiuk, rescued. Suffered facial injuries and frost bite.	Plane on flight from White Horse (Yukon Terr.), to Meadow Lake (Sask.) via Fort Nelson (BC). Pilot, who had flown route 48 times previously, was going home to celebrate parents wedding anniversity. Plane crashed at 5,300 foot level of mountain in bad weather. Passenger on board killed. COSPAS I Signals received by Kokiak LUT late PM June 2. Bad weather precluded survivor pick-up until AM June 3. Flown out by chartered helicopter to Fort Nelson Hospital.
June 11	Alaska, 65°34 N, 164°49′ W on Seward Peninsula.	PA–12, red & cream N989A, single engine Piper Cub.	1 person Carl Gravogel, P.O. Box 941, Nome, Alaska (only person on board) Employee of Alaska Fish and Game Commission.	Plane overdue on flight from Nome to numerous wilderness areas and return to Nome. Flight Service reported overdue at 2300 local, June 10. Satellite reports confirmed, and Civil Air Patrol aircraft was launched from Nome at 0349 June 11. Aircraft down because of engine failure, located at 0650 June 11. Uninjured pilot walked 6 miles to nearest airstrip, where he was picked up and flown to Nome. CAP flew 2 sorties for 4.1 hrs flying time. CAP pilot, Mr. Wendell Wassman. Weather VFR.COSPAS I and II signals to within 7 miles of aircraft, about 20 miles East of Nome.
June 22	Canada, Dawson City, Yukon Territory.	Type aircraft not known.	1 person, name unavailable.	Details not available.
June 24	Florida, 40 mi North of Cedar Key on west coast of Florida, about 95 mi North of entrance to Tampa Bay.	24-ft pleasure craft, Pioneer II.	5 persons on board; Dr. Larry Bachnik, dentist; Jim Aerts, general contractor and their sons, Eric and Frank Bachnik (15-year-old twins), and Mike Aerts, 9; all of St. Petersburg.	Irrepairable malfunction in stern drive unit and taking on water. Radios would not reach Coast Guard. EPIRB signal picked up by COSPAS I and COSPAS II and repeated to Scott AFB, Ill., where officials notified Seventh District Coast Guard in Miami. 41-foot patrol boat out of Yankee-town, Fl. rescued. Distress began Friday afternoon June 24. Coast Guard reached Pioneer II at 0400 local June 25. Towed boat to port. No injuries.

COSPAS/SARSAT RECORD LIST OF EVENTS—AUGUST 17, 1983—Continued

[Number of persons rescued to date—60]

Date	Location	Type of ship/plane (name and tail No.)	Number of persons rescued	Details
June 25	Alaska, 61°28′N, 164°17′W near Prince William Sound.	PA-18 white and green N2568J single engine Super Cub.	3 persons, pilot was George Murphy, 8502 Heather Circle, Anchorage. Passengers names not available.	Anchorage Flight Service reported overdue aircraft on a sight-seeing flight from Lake Hood near Anchorage to Knik Glacier, 35 mi northeast of Anchorage. Plane flipped onto back on landing. After several reports received from COSPAS satellite, Civil Air Patrol alerted and launched aircraft 0455 local, June 25. CAP crew of Mr. Mel Fry and Mr. Griffin located aircraft at 0616 June 25. Alaska State troopers launched helicopter, piloted by Mr. Larson, from Anchorage at 0715. Helicopter reached scene at 0820 and picked up 3 uninjured survivors. The 3 had walked 6 mi from aircraft. COSPAS I and COSPAS II signals to within 3 mi of aircraft. The search was about 30 miles southeast of Whittier.
July 1	Livermore, Calif	Grumman Cheetah single-engine.	1 person	Reginald Petty, 58, certificated flight instructor with 10,000 hours, of Fair Oaks, Calif., in flight from Phoenix Field, Sacramento, to Livermore, no flgiht plan, crashed into hillside about 7 a.m. Coordinates determined from COSPAS Signals around 2 p.m. and rescue carried out by East Bay Regional Park Service helicopter about 2:30 p.m. Taken to Valley Memorial Hospital, Livermore, then transferred to a hospital in Sacramento. Suffered broken jaw, skull, and hip. Still in hospital as of July 22, 1983.
July 29	Venezuela, off coast in Atlantic. Coordinates: 11°N, 64°W.	Seaplane. Make not available.	2 persons—names not available.	Signals picked up by Scott, which alerted 7th District HO at Miami. CG notified Venezuelan authorities, who affected rescue 20 minutes after receiving Telex.

COSPAS/SARSAT RECORD LIST OF EVENTS—AUGUST 17, 1983—Continued

[Number of persons rescued to date—60]

Date	Location	Type of ship/plane (name and tail No.)	Number of persons rescued	Details
Aug. 29	Canada, southwest of Hudson Bay. Coordinates: 53°37′N, 87°04′W.	Canoe	2 persons—Allan Berry and Jeff Hyatt, both of Ottawa.	Pair making white water trip to Winish River when canoe capsized on the Tasha Rapids, putting both ashore with minor injuries and 3–4 days supply of food Activated ELT. Picked up by SARSAT on 2 passes, making first SARSAT assist in rescue. First signal received at 1540Z (1140 local) August 1. Second signal received at 1733Z local). Canadian rescue forces launched Buffalo two engine aircraft within hour but because of distance did not reach area until 0039Z 2039 local). Spotted survivors on second pass, dropped portable radio, called provincial government for assistance. Ontario's Ministry of Natural Resources arranged for helicopter pick up. Survivors brought to Moosonee, Ontario, hospital.
Aug. 6	Maine coordinates: 45°53′N, 68°53′W.	Single-engine Piper Cherokee, white and green. Call sign CGPJX (Canadian).	3 persons. Pilot, Dale Brooker, address not known, and two passengers.	Plane on flight from Sherbrooke, Quebec, to Fredericton, New Brunswick. Plane crashed at 3,600-foot level on Mount Katandi, about 15 mi northeast of Millinocket in centeral Maine, in bad weather, 300-foot ceiling, ½-mi visibility. Canadian rescue forces picked up survivors and flew to hospital in Millinocket. Pilot suffered serious injury; one passenger had broken arm; and the other one was in good condition. First notification from Trenton (Canada) RCC COSPAS/SARSAT combined.
Aug. 8	Canada: British Columbia Coordinates: 57°37′N, 87°09′W.	Type aircraft unknown. Believed to have U.S. registry.	2 persons. Names not available.	Details not available. Signals repeated by COSPAS 1.

Saves: air—37; marine—23.

Senator GORTON. First for Mr. Hutcheon, how does flood warning information get disseminated in the Mount St. Helens area? Does NOAA weather radio play a major or a specific role in that?

Mr. HUTCHEON. No; we disseminate flood warning information in the Mount St. Helens area essentially the same way we disseminate any type of flood warning information. We issue the warning; it goes out over an AWAS to the county officials; the county officials then fan it out through their procedures. Down in the Mount St. Helens area they've developed a siren system and other types of systems. In addition, it goes to the mass news disseminators on our NOAA weather wire service, so that all the commercial radio stations have it available. We also put it on our NOAA weather radio from the Olympia office on Boisfort Mountain, where the warning alarm is pressed, so that people in that area that do have NOAA weather radios can receive it that way also.

So, essentially, any warnings associated with flooding in the Mount St. Helens area get total dissemination through all the channels that we have available.

Senator GORTON. Mr. Trudell, what increase in efficiency—what effect—do the second and third search and rescue satellites have on the program, and what would be the optimum number?

Mr. TRUDELL. Well, without giving you the specifics of the effect upon each, of course the addition of each satellite cuts down the time that remains for a person to wait for coverage. In general statistics, one satellite passes over each part of the Earth at least twice a day. Now, that varies according to latitude; it could pass, for instance, in this latitude here, about four times a day. And so the gap—if you had one satellite—would be on the order of about 8 or 9 hours before it would come around again, once you had those first two orbits.

Now, if you put a satellite in an orbital plane perpendicular to the other one, you can see that it cuts that about in half. So, now the waiting time becomes about 4 or 5 hours. And then add, at equal spacings, additional satellites, and you get down to an area of about a couple of hours.

There is an added advantage of additional satellite passes. One of the things—a little detail, if you will that I didn't mention—is a location. In a first unique location from a satellite, you actually have a real and an image location that's achieved. And you're not sure, because of instability in the frequency of the distress transmitter, which is the real and which is the image. Now, a second satellite pass coming soon after that will resolve that ambiguity. And that's a big advantage in solving the ambiguity problem.

Now, you have probably heard that we do have a serious problem in this country in the false alarm situation. That is particularly important because with all the false alarms we quickly want to eliminate that redundancy in the data. Additional satellites will help to reduce that ambiguity and allow us to pick the real solution earlier; and, of course, along with the basic tenet that time is of the essence. If a party is very badly injured in a crash or in any emergency, we want to bring the search and rescue resources to bear as soon as possible.

Senator GORTON. You're from NASA; could you tell me whether or not NASA is managing the program now because it's still considered a development program? And what agency is most likely to assume that operational responsibility in the future?

Mr. TRUDELL. Part of this would be conjecture, but you're right. NASA still considers this program a development program. We are conducting development primarily in the processing and the handling of the data, because there are operational problems that we are discovering as we receive data—particularly from different parts of the field. We are continually trying to develop and improve the processing.

You realize—and I have to be a little bit proud on this thing—we are processing a signal only as strong as a garage door opener from 600 miles in space; and, they said it couldn't be done. Believe me, there were times I went to bed when I wasn't so sure it could be done, either. So, it's kind of a modern miracle of processing, that we are able to process the signal at all; I think we're doing a heck of a job. However, we have improvements identified; so we are developing those.

Now, as we complete our demonstration phase and hopefully refine our processing, we would like to see the operational agencies—the Air Force, the Coast Guard and NOAA take a more active management role. Perhaps the most likely scenario would be for NOAA to pick up the operation of the space segment and the Air Force and Coast Guard to continue with the ground segment. We think that NOAA's charter as the operational agency for civil remote sensing would enable them to pick that up as a continuing service to provide to the search and rescue agencies just as they provide similar space services to the other Government agencies.

Senator GORTON. How is the Sarsat capability included in the administration proposal to transfer the weather satellites to the private sector?

Mr. TRUDELL. I don't know the details of that, sir. But my understanding is that the carriage of search and rescue structure will be included in that. There is, of course, what we feel is a great danger because, as we alluded to in the statement here, we're on board the NOAA satellite because it was economical to get on board. We were added on a cost-incremental basis. Well, our deal with NOAA for getting on the satellite, was: You're flying a meteorological satellite anyway. Now, how much additional cost is it to add the search and rescue mission? And so we paid that add-on increment. That add-on increment is a very economical way to fly the search and rescue mission.

Now, if somebody went on to say, on the other hand, "You're going to pay a proportionate share," well, then we might sit back and say, "Well, we don't know if we want to pay that much. And it might be too expensive. We may have to look at other approaches."

Senator GORTON. That leads to a final question on cooperation: that is a fine example, not only of internal cooperation, but more specifically of international cooperation. Is it any kind of precedent for cooperation with, say, Landsat and with the French and other similar programs that are going on or that are potential at the present time?

Mr. TRUDELL. I'm not sure how I'd relate the type of cooperation we're getting in the search and rescue field with the Landsat or the others. There is a spirit of cooperation that exists that is almost overwhelmingly apart from the normal politics that are played between and among countries. Our cooperation with the French, the British, the Norwegians, the Swedes, and Canada has been outstanding. Our cooperation with the Soviets has been outstanding. Throughout the period of time that I've dealt with the Soviets, from 1975 through the current time, absolutely no change in our level of cooperation or spirit of cooperation has occurred, despite the wide range of changing national politics between the two countries. I think it's the fact that search and rescue is sort of like Red Cross or like hospital-type aid. It's recognized as something that's above politics. And I don't know if you can then say that you can also get cooperation in other areas such as Landsat, in the same spirit. Because those, after all, enter into the profitmaking area. But in my book, I'd like to see more cooperation. I'd like to see satellites used as a mechanism to encourage more international cooperation.

Senator **GORTON**. Thank you both.

Now, this portion of the hearing is now adjourned. The demonstration of the Sarsat capability will follow immediately on the roof of the Exchange Building next door.

[Whereupon, at 11:55 a.m., the hearing was adjourned.]

ADDITIONAL ARTICLES, LETTERS, AND STATEMENTS

STATEMENT OF BRIAN BOYLE, COMMISSIONER OF PUBLIC LANDS, STATE OF WASHINGTON

Mr. Chairman, I am Brian Boyle, Commissioner of Public Lands for the State of Washington, Department of Natural Resources. Mr. Barry Aronovitch from the Olympia fire weather office will also be providing more specific information in his testimony.

The "DNR" protects 12.5 million acres of private and public lands from wildfire. The remaining 14 million acres of Federal lands in Washington State are protected by various Federal agencies. Each of these protection agencies relies on the services of the National Weather Service fire weather program. Without adequate fire weather services, it would be impossible for these agencies to fulfill their protection responsibilities.

In addition to forest fire protection, the legislature has directed DNR to administer the State Smoke Management Program. This program provides for air quality regulation for silvicultural activities throughout the entire State. It is a cooperative effort of the DNR, Washington Forest Protection Association, the United States Forest Service, the Bureau of Indian Affairs, and the Washington State Department of Ecology. The Smoke Management Program addresses the preservation of air quality in populated areas as well as Federally mandated Class I and wilderness areas. The 1977 Amended Federal Clean Air Act requires the protection of Class I areas from human-caused air pollution. Eight Class I areas in Washington covering nearly 4 million Federal acres are to receive this protection. Implementation of additional visibility protection for these areas makes the forecasting services of the National Weather Service increasingly more important to my agency. DNR currently operates six remote automated weather stations and has plans to purchase additional weather equipment to enhance the program to meet the requirements of Class I area protection.

The protection of forest lands and the maintenance of air quality are both of major concern to the citizens of our State. Washington and the adjacent states of Idaho and Oregon produced 25 percent of the timber harvested in the United States in 1981. In addition to direct employment in the forest industry, one in five manufacturing jobs in Washington are directly related to the forest products industry. Many additional jobs are dependent upon recreational activities that take place on Washington's forest lands. And, all of Washington citizens enjoy the Evergreen State's well known clean air.

Forests are one of the Evergreen State's greatest assets. Adequate protection of this resource depends upon accurate and timely weather observations and forecasts.

Providing such services is in the National as well as State interest. Recognizing this, we have entered into a cooperative agreement with the National Weather Service. The Department provides office space and services for two National Weather Service meteorologists and also employs one agency meteorologist. Through this agreement, we receive professional assistance, weather data, and mobile forecasting units. The Department also utilizes the NOAA satellite service for the collection and transmission of data from remote field weather stations.

The Olympia weather office is located at the center of the Department's statewide communications and data collection center. This office provides overall state coordination and forecasting for the majority of western Washington. Additional fire weather offices in Portland and Wenatchee provide forecasting services for the southern and eastern portions of our State.

The June 1983 Booz-Allen and Hamilton consultant study proposes some sweeping changes to the organizational structure and services currently being provided by the National Weather Service. DNR considers the current weather program to be a Federal-State partnership. The Booz-Allen recommendations violate this partnership and we therefore do not endorse the study. Should these proposals be implemented, I fear that our citizens will suffer increased loss of resources, and perhaps human life, from fire. They would also be subject to more frequent episodes of air quality degradation. Therefore, we feel that (1) the fire weather program is of such importance to the public that it should be included in the core mission of the National Weather Service, (2) weather conditions are so diverse in this State that a reduction in the level of fire weather service offices would be unacceptable, and (3) it is in the National interest for the Federal Government to continue to operate the satellite service.

In summary, the services currently being provided by the National Weather Service fire weather offices are essential to the adequate protection of Washington's forests and air quality. All citizens are dependent upon the continued availability of these services. The most efficient level of service can best be provided by one agency, the National Weather Service.

STATEMENT OF STEPHEN L. GILLETT

Mr. Chairman and distinguished members of the committee, I as a consulting geologist currently residing in the Seattle area who has both personal and professional interests in space activities. I am speaking here as a private citizen.

The services provided by the private sector can oftentimes be more efficient, and the quality of service be better, than similar services provided by the government. Such improvement stems, of course, from competition. Hence, acquisition, maintenance, and upgrading of the weather-satellite systems by the private sector might lead to better public service.

Indeed, the present government weather-satellite technology is out of date. If the proper economic incentives were present, the private sector might provide major upgrades in service (e.g., direct, individual forecasts broadcast via satellites to home receivers).

However, weather service is a function which is vital to the national interests of the US as a whole, just as are other "infrastructure" functions such as highways, air and marine navigation, mapping and resource inventory, and so on. Weather services are *not* a "discretionary" service that could be allowed to wither if the private sector felt that there were insufficient demand.

In this connection, it is sometimes argued that the furnishing of detailed weather data to specialized users such as agriculture and aircraft constitutes a "subsidy" of special interests by the taxpayers. This argument is unconvincing. Many activities carried out by the government could be interpreted as "subsidizing" one segment or another of the population. Examples include: the power dams, such as those on the Columbia River, the Colorado River, or in the Tennessee Valley; navigational aids, such as the dredging of the Columbia River, or of the Mississippi River, by the Army Corps of Engineers; or finally, the detailed mapping carried out by the Geological Survey.

All these activities, in some sense, "subsidize" one region or group. However, the overriding consideration in such cases is not subsidy per se but whether the interests of the nation as a whole are better served. Again, a healthy infrastructure leads to a healthier economy, and a better life, for all Americans.

Therefore, I see major deficiencies in the present proposal to sell the weather satellites, and Landsat, to the comsat corporation. My objections are as follows:

(1) No mandated monopoly on weather service should be granted to any single entity, such as Comsat; indeed, competition should be encouraged. A monopoly would negate the public benefit of private sector involvement, which is to provide incentives for better public service through competition.

The experience with other mandated monopolies, such as telephone communications, is not encouraging as to either the quality or the level of service provided to the public. As we know, the taxpayers spent many millions of dollars in the recently settled antitrust case against AT&T. It seems probable that the new telephone system, in which competition will exist, will eventually result in cheaper and improved telephone service. Furthermore, it is possible that improvements in service were held back during the years when AT&T had its monopoly, because there was little incentive to provide better service.

However, the potential benefits to the consumer were dearly bought with taxpayers' money and the realization of benefits is some years away. To establish a new monopoly on weather services, for the avowed goal of "saving the taxpayers money", would not seem particularly farsighted. It may well be that taxpayers' money would need to be spent later on to dismantle such a monopoly.

(2) The government should "drive a hard bargain" any sale of present-day equipment, including satellites and ground facilities. The taxpayers have a right to expect top value for their investment. A "fire sale" approach is neither indicated nor warranted.

(3) The private sector has a dismal record, by and large, in carrying out basic scientific research because the payoff is long-term. However, such research is vital to the continued economic and military health of the nation. Tomorrow's products depend on today's research.

Hence, a possible harmful effect from privatization of the weathersats would be the denial of access of weather data to researchers. Also, it may be difficult to commit sensors or satellites to investigate atmospheric phenomena whose significance is not now known, but which eventually may be very important for the understanding of weather and climate. To businesses, accustomed to the short-term horizon of "next quarter", the additional expenditures for such possible long-term payoffs are virtually impossible to justify.

Such questions are particularly relevant to Landsat, which is proposed to be included, almost as an afterthought, in the disposal of the weather satellites. Unlike weather satellites, for which a proven market exists for the data, Landsat is still experimental. It seems accepted both in government and industry that the market for remote-sensing data, similar to those now provided by Landsat, will be very large in five to ten years. Such a market, however, does not yet exist.

It seems probable that a private concern would neither be willing nor indeed able to make the massive, up-front capital investment, probably totaling billions of dollars, that will be necessary to make remote-sensing technology commercially viable. Nonetheless, possession of such technology is in the long-term interests of the US as a whole. Furthermore, combined government-private sector entities in Japan and Western Europe are currently engaged in developing this technology. Thus, it seems that there is still a major role for government in research and development on remote sensing.

(4) The liability questions of private weather-sensing services also need to be investigated. For example, in the case of a weather-related airline disaster, or of massive crop destruction due to storms, would the private weather service be liable for alleged deficiencies in forecasting? At the least, it seems that the criteria for minimum service in weather forecasting could be difficult to define, establish, or enforce. And the possible savings to taxpayers could be outweighed by protracted litigation.

In conclusion, privatization of weather satellites may eventually provide better public service. However, careful consideration must be given to the ramification of privatization. In particular, it seems unlikely that better public service would devolve from establishing a monopoly.

Thus, the question that must be asked in any proposed sale of the weather satellites is: Will better public service be provided, and will the long-term interests of the US be better served, by privatizing weather services? The question is not simply whether some entity can make a profit from providing weather data.

STATEMENT OF WILLIAM H. LARSON, DIRECTOR, KEEP WASHINGTON GREEN ASSOCIATION, INC.

We understand that this committee is examining the role of the federal government in the fire weather service. I have been authorized to make the following remarks on the behalf of the Keep Washington Green Association. Keep Washington Green was organized in 1940 by a consortium of several elected and appointed state officials and representatives of major landowners. Its sole job is prevention of forest and range wildfire by public education. It uses forest fire meteorology in its work. My personal experience with the federal forest fire weather service dates to 1946 when I was appointed Assistant Manager of Washington Forest Protection Association, a private landowner group.

The story of the federal fire weather service is one of a dedicated group of federal scientists working hard to meet the demands of the user groups. These demands exceeded the available data and analytical systems so there was a great effort to expand both. Through the years these forecasters refined their craft as more facilities, data and analytical knowledge and manpower became available.

The users of this service are the forest landowners who are the federal government, private owners and the state. The beneficiaries include all the citizens when one considers the unmeasured values protected such as water and air quality, scenery, recreational opportunities and so on. At the close of the decade of the 60's a new dimension was thrust into the scene of evolving weather forecasting competence. The federal government required the states to comply with a system of air quality standards. This collided with slash burning practices. Suddenly slash smoke must be kept from urbanized areas if it caused the air quality standards to be violated. Managing the smoke required an expanded technology based on meteorology and additional staffing. It increased the landowners costs many fold. During the last year the federal government is increasing its demands as it implements its air quality standards on its class 1 lands and the associated "integral vistas". Coping with this matter is just beginning but it is taxing the capabilities of the smoke management system.

In summary, Keep Washington Green believes that the federal government should continue and expand its role in forest fire meteorology for the following reasons:

1. The federal government owns and provides protection from fire on a very large percentage of the land in the country. It is therefore the major user of the service.
2. Aside from its land ownership, the public of the state and nation is a major beneficiary of the fire weather service. This service is a key ingredient in the protection from fire of many unmeasureable values such as water and air quality, scenery, recreational opportunities and so on.
3. The federal government by law has demanded that the states meet certain air quality requirements. To comply with these requirements, slash burning practices of the forest landowners had to be greatly altered as a smoke management system was implemented. These forest landowners who burn slash are the federal government, the state, and the private owners. This alteration placed much heavier demands on the fire weather system.
4. The federal government is placing even heavier burdens on this fire weather system by its air quality policy in the "Class 1" areas. This cannot be called a public health or safety issue, it is an enhancement of the recreational values on federal land at the expense of other values on federal, state and private lands.
5. The state is providing at least its share in this cooperative meteorological effort. It provides much of the equipment, communication, housing and personnel in the system.
6. All landowners have been forced into major extra slash burning expense by these requirements. Costs have increased many fold.

Thank you for including these remarks in the record of the hearings on this subject.

STATEMENT OF NOWCASTING, INC.

Nowcasting, Inc. (NCI), a not-for-profit corporation based in northern California, is directed solely by California growers and farmers for the benefit of agriculture and education. NCI provides site-specific and commodity-specific weather data services (including localized forecasts and weather warnings) for its clients, which are mostly growers and farmers.

NCI is basically opposed to for-profit commercialization of the weather satellite systems. NCI does not see any likely advantage to this kind of commercializing of the satellites, although there are valuable weather satellite products which are not readily available today from the Federal sector. It feels that a clear danger exists that a monopoly would be created for the owner; and that monopoly, in turn, could create problems for users (e.g., inside knowledge of changes in service accruing to the owner, and unreasonable increases in data prices). NCI believes that the quality of data and services may well improve if the satellites were in private hands and if the related services were designed and marketed aggressively using private-sector management methods.

NCI feels that monopoly problems can be avoided: (1) if the private owner would be prohibited from all participation or ownership in the value-added service industry; and (2) if the satellite data stream would be delivered to all users (including foreign governments) at the same price. These steps would also result in a strong and vigorous value-added industry in the private sector. NCI explained that if the U.S. Government requires that the private owner give the data free of charge to foreign governments, then the U.S. taxpayers would be subsidizing foreign governments which are increasingly competing with U.S. companies, which engage in private meteorlogical services.

NCI believes that all taxpayers would probably suffer under for-profit commercialization because: (1) the Government, which is believed to be the major user of weather satellite data, while perhaps paying lower operating costs, would also have to pay the new private owner's profit margin, and (2) the Government would also incur costs to regulate and monitor the new monopoly.

On a separate, but related matter, NCI emphasized that, whereas it does not believe the Government should commercialize the satellites, some changes are required to invigorate private-sector use of weather satellite images. It believes the NWS should be constrained to just providing: (1) "raw" weather (including satellite and international) data to numerous value-added companies throughout the nation; and (2) only broad regional and national forecasts and warnings. NCI believes that the private sector is best suited to providing localized weather information both to the identifiable segments of the public and to special interest groups within the general public. Finally, it believes the NWS forecasters would be better utilized out in the field working cooperatively to provide such services in partnership with the private sector.

WASHINGTON STATE GRANGE,
Seattle, Wash., August 16, 1983.

Hon. SLADE GORTON,
Senate Committee on Commerce, Science, and Transportation, 2988 New Federal Office Building, Seattle, Wash.

DEAR SENATOR GORTON: The purpose of this letter is to inform you of our policy regarding the closure of the weather stations which serve the agricultural community in the State of Washington.

Last year you received from our organization a resolution passed at our 93rd annual convention in Vancouver, Washington. That resolution, in short, called for National Oceanic and Atmospheric Administration to reconsider its proposal to close the Wenatchee weather station and other stations which serve agriculture.

We believe these weather stations provide an invaluable service to farmers in the form of frost warnings and other information vital to making our State the agricultural leader it is. If these stations are not kept intact, there is nothing comparable to take its place that doesn't require a huge capital outlay by agriculturalists. The Federal Government should maintain these stations for they are as much a national asset as the crops which are produced because of the good information they provide.

We implore you to do all in your power to keep these stations open. Thank you for your help.

Sincerely,

RAY HILL,
Master, Washington State Grange.

STATEMENT OF JOE HOPKINS, PRESIDENT, SEATTLE L-5 SOCIETY CHAPTER ONE

Mr. Chairman and distinguished members of the Committee, the Seattle L-5 Society is a nonprofit educational organization promoting the development and eventual settlement of outer space. We believe that this new frontier offers great benefits for individuals, our nation, and the world.

We would like to go on record in support of the statement presented to this Committee by the Washington State Citizens for Space (WSCS). We believe that commercialization of weather and Earth observation satellite systems will encourage development of space resources and in the long-run will improve our lives.

Thank you.

[RESOLUTION]

RESOLUTION REQUESTING CONTINUATION OF LOCAL WEATHER REPORT SERVICE—AUGUST 2, 1983

Whereas we are informed that it is possible the weather report service and fruit frost warning alert may be discontinued in this area, and

Whereas this organization proposed and adopted a resolution directed to the National Oceanic and Atmospheric Administration, our Congressional delegation, the Washington State Grange, and others, requesting that this service be maintained, and

Whereas this resolution, a copy of which is attached, was approved and adopted by the delegate body of the Washington State Grange at its 1983 Convention held in Everett, Washington, and

Whereas we are now firmly convinced that the frost warnings and weather report should not be closed, but continued as a vital service to our fruit industry and Forestry Department, and now therefore be it

Resolved, That copies of this resolution be sent to Senator Henry Jackson, Senator Slade Gorton, Representative Tom Foley and Representative Sid Morrison the National Grange Master, Ed Anderson and the Tree Fruit Experiment Station in Wenatchee, WA.

Done in regular session this 2nd day of August, 1983 at East Wenatchee, WA.

East Wenatchee Grange #1012.

THORA W. DICK,
Master.

LUCILLE FIFE,
Secretary.

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